MODERN Machine Shop

HOWARD CAMPBELL, Editor

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MODERN Machine Shop

MAY, 1932

CINCINNATI, OHIO VOL. 4, NO. 12

Control of Warping in Preheating for Welding

In Which the Author Gives Directions for Building Up Supports to Prevent Castings From Sagging When Hot

By JAS. M. VOSSLER

Welding Supervisor, Southern Pacific Lines, Houston, Texas.

ONE of the important problems that often confronts the welder is the control of warping when large castings are to be preheated for welding. The extent of the warping depends largely upon the evenness of heating, arrangement of supports beneath the casting, and the evenness of the cooling. It is obvious that warping can rarely be entirely prevented, but by exercising proper care when preparing the casting for preheating, and by proper heat control both during preheating and cooling operations, warping can be controlled to such a point that it will be negligible for most practical purposes.

Large castings are usually pre-heated with charcoal. This fact makes it necessary to raise the casting from 8 to 12 inches above the ground so that the fire can burn properly beneath it. The number of supports that will be required to support the casting will depend entirely upon the weight and dimensions of the piece. They must be placed close enough together to prevent the casting from sagging when red hot, yet they must be far enough apart so as to avoid interfering with the fire. It is very important to choose a location for the furnace where the ground is hard-packed, so that it will not settle due to the weight of the casting and its plasticity when hot.

Fig. 1—Type of casting with which supports are needed to prevent warping while welding.

In preparing a spot for preheating a large casting, all loose sand and dirt should be brushed away. The casting should then be blocked up on piers of scrap brick to the height mentioned above. It will be found best to place three piers in position beneath the casting first, due to the well-known fact that any weight will rest solidly upon three piers, whereas if more than three piers are used, all but three will probably have to be shimmed in order to make them support their portions of the load. These three piers must be placed at advantageous places beneath the casting.

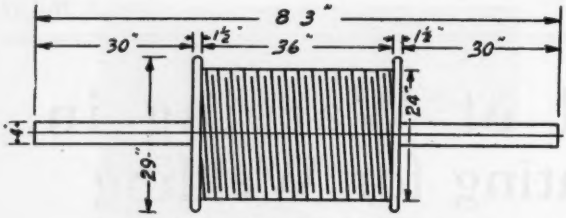


Fig. 2—Drawing of cable winding drum.

It is seldom, however, that a casting can be supported on three piers alone for preheating; other piers will be required to support the casting properly and prevent sagging, as mentioned above. The exact spacing of the piers cannot be specified by rule. It has been the writer's experience that center distances approximating 18 inches will ordinarily answer, but the size and shape of the casting, together with the weight distribution, must govern this matter.

The additional piers should likewise be built of scrap brick and should extend up to within about an inch of the bottom of the casting. Between the tops of these piers and the bottom of the casting, wet clay—preferably fire clay—should be placed. By the time the casting has been heated sufficiently for welding, the clay will be baked hard enough to bear its share of the load. This baked clay will provide an even support on all piers. Shims and small wedges were formerly used between the tops of the piers and the work, but the results obtained could not compare with the success of the fire clay method. The clay is easiest to apply, and will provide a large, even bearing.

Figure 1 illustrates the type of casting under which such a support was necessary. The casting was laid on its side and support was provided for the arm-like projections, with a spacing support between them. This support was easy to construct by the use of broken brick and wet clay.

In instances where the clay shows a tendency to crumble before it is thoroughly dry and hard baked, it can be reinforced by the insertion of pieces of steel welding wire.

There are cases where the form of support described above does not serve adequately to prevent warping, such as, for instance, the case of a locomotive cylinder. When a locomotive cylinder is heated sufficiently to make a large weld, the greater portion of the casting is at a red heat. Supports can easily be provided for the valve and saddle portions of the casting, but the bottom portion of the casting proper presents a problem.

If the bottom portion of the casting is left unsupported, it will sag when heated and thus will pull the cylinder out of round. When cooled, the cylinder will be egg-shaped. If a clay-topped brick pier is built up under the bottom of the cylinder, the expansion of the metal in preheating will throw the cylinder out-of-round sidewise and when the cylinder cools, the bottom will be found to have

raised from ⅛ to $\frac{3}{16}$ in. Of course, this metal can be bored out, but the removal of the metal thins and weakens the cylinder wall, consequently no more boring than is necessary should be done.

In order to bring the bottom of the cylinder back to its original position after cooling, it was necessary to find some means of allowing a space between the tops of the piers and the bottom of the cylinder to allow for the natural expansion of the cylinder wall and at the same time prevent it from sagging. It is obviously impossible to place wet clay to within $\frac{3}{16}$ in. of the cylinder bottom and maintain an even space. The desired results were obtained, however, by placing oiled corrugated pasteboard against the bottom wall of the cylinder and then filling in with fire clay between the brick and the corrugated paste board. When the cylinder wall becomes hot, the pasteboard will burn away and thus leave the necessary space to allow for the expansion of the cylinder wall. Where convenient, it is a good idea to dip the corrugated pasteboard in hot paraffin, thus making it firm as well as moisture proof. Pasteboard thus treated will maintain the required space more accurately. Ordinarily, one thickness of corrugated pasteboard will answer the purpose.

A welding job in which warping was prevented with extreme difficulty is illustrated in Fig. 3 and 4. The work-piece consisted of a cable-winding drum, made of cast iron, cast around a bar of hexagon iron. The bar was later turned at each end to form the drum shaft. A large section had been broken out of the flange at each end of the drum, and the job was to weld the broken pieces in place.

In order to properly weld the flange section in place, it was necessary to preheat the drum to a dull red heat before welding. However, unless some extraordinary precautions were taken, it was certain that the shaft would sag at each end. And any warpage, however slight, would ruin the shaft for further use. No means of supporting the shaft could be

Fig. 3—Position of cable winding drum for welding broken flanges.

thought of whereby the welder could be sure that all warp would be prevented.

Finally it was decided to dig a hole like a post-hole in the ground and place the drum in a vertical position, with one end of the shaft hanging in the hole. The lower end of the drum was supported on three brick piers about 10 in. off the ground. The shaft was then plumbed by placing a spirit level against the upper shaft and shimming the drum until the shaft was vertical. This method was based on the theory that, being of large diameter, if the shafts were plumb, they would not warp.

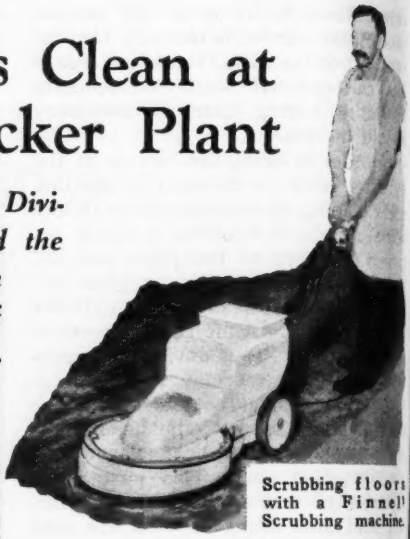
Figure 4 shows the drum in the furnace. (It will be noted that the

(*Continued on page* 14)

Keeping Floors Clean at the Larkin Packer Plant

Clean Floors in the Plant Pay Dividends; the Problem is to Find the Best Method of Cleaning Them Within Reasonable Limits of Cost. Here is How It's Done.

By H. K. LAWRENCE



Scrubbing floors with a Finnell Scrubbing machine.

THE condition of the floor in a manufacturing plant is important—much more important than is generally supposed. The condition of the floor—clean or dirty—affects in a large measure the morale of the workmen, the mental attitude of these workmen toward their work and their employer, the quality of the work, and the speed and efficiency with which the daily task is performed.

No workman, however unintelligent, fails to react mentally to his surroundings, and the more intelligent he is, the greater the reaction. Consequently, it is impossible for intelligent mechanics to have the same attitude toward their jobs in a shop where the surroundings are black with grime and the floor is gummy with dirt and oil that they would have in a plant where the floor was clean.

The old idea that all work is dirty and that a workshop should be expected to be black and grimy is fast becoming obsolete. Cleanliness in the shop pays dividends in the form of better morale and increased efficiency in just the same way that personal cleanliness increases the morale, self-respect, and health of the individual. The better class of mechanics and artisans recognize this fact and often a high-class mechanic will refuse a job in a dirty shop at increased remuneration in order to remain where the surroundings are clean and orderly.

To the plant manager who is aware of the conditions outlined above, the problem becomes one of the most economical methods of cleaning. The problem was solved by the Larkin Packer Company, of St. Louis, by the use of specially-constructed scrubbing machines that make it possible for one man to cover more floor, and clean it better, than could possibly have been done by several men using the broom and mop method.

The Larkin Packer Company and its subsidiary, the Davis Boring Tool Company, occupy a plant containing 15,000 square feet of floor space. Fifty production machines are constantly at work, turning out tool equipment

(Illustrations courtesy Finnell System, Inc., Elkhart, Ind.)

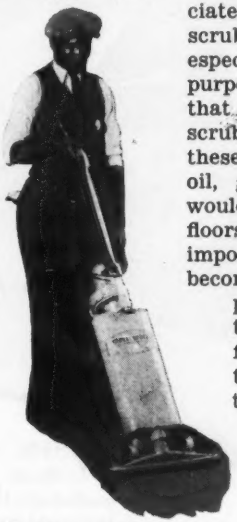
for railroads, automobile plants, and oil wells, and nearly 200 men are employed in the manufacturing departments. The companies also operate their own heat treating plants and are able to take care of a limited amount of commercial work.

The production machine equipment is comprised largely of automatic lathes, automatic screw machines, and other machines in which a large amount of cutting oil is used. Although shields and drip pans are used wherever possible, no method has thus far been devised by which the oil can be kept from splashing onto the floor. The floor was swept at regular intervals, but the combination of oil, grease, and dirt that gathered on the floor in the course of a day formed a coating that was practically impossible of removal by the ordinary methods.

It was found that the usual methods of sweeping merely served to spread the greasy refuse over a larger area, each additional sweeping adding an additional coat to the thick, gummy layer, which was finally removed by the use of a scraper. The sweeping, of course, removed metal shavings and other refuse, but no amount of sweeping could remove the oil.

The absorption method was tried, but proved unsatisfactory. When it was found that the heavy, greasy coating could not be soaked up, the use of sawdust was considered. The sawdust will absorb a certain amount of the oil, but the sawdust must be swept up immediately after being spread because the insurance companies look upon oil-soaked sawdust in the light of a fire hazard. There are other agencies that can be utilized, but unless they are removed at once they pack, and again an objectionable coating is formed which must be removed by scraping by hand.

After much study had been given to the cleaning problem, and after every possible method of cleaning had been investigated, Mr. Kilzer, President of the company, and his associates decided upon the use of scrubbing machines that are especially designed for the purpose. Experiment showed that if the plant floors were scrubbed once a week with these machines, every bit of oil, grease, and packed dirt would be removed, leaving the floors as clean as new. It was impossible to prevent dirt from becoming imbedded in the pores and small cracks in the concrete, but it was found that the construction of the brush is such that dirt is removed from the smallest crevice.



The Vacuum Mopper draws the dirty water up into the tank.

The scrubbing machine carries a circular brush, made in five sections and set into a ring that is 18 inches in diameter. The sectional construction provides flexibility where the floors are uneven. This brush is rotated at a speed of 175 r.p.m., power being supplied through a ¾ h. p. motor that connects with the lighting system. As the brush rotates, water is delivered to it automatically from a 4-gallon tank that is located so that the weight of the water is largely balanced by the brush. The outfit is mounted on two rubber-tired wheels so that it can be tilted to any angle desired in order to apply the necessary pressure.

(*Continued on page* 14)

Keeping Floors Clean

(*Continued from page* 11)

As the scrubbing operation proceeds and the scrubbing machine is moved forward across the floor, a continuous stream of clean water is fed to the brush and the dirty water is left behind. This dirty water is taken up by a vacuum mopper that consists of a combined rubber squeegee and motor-driven water absorber. The dirty water is drawn by suction into a tank that can quickly be emptied when full. No pressure is required, and there is nothing to "wring out." As the tank holds 2½ gallons of water, a large area of floor space can be covered before the tank is filled.

The floor-cleaning operation at the Larkin Packer plant is handled by two janitors, in addition to their other janitorial tasks. The factory floor is scrubbed once a week, in the evening, and once a month the floor in the warehouse, containing approximately 12,000 square feet, is thoroughly scrubbed.

Mr. Kilzer is quoted as saying that the new program of cleanliness has worked to the advantage of the plant in various ways. The bright, clean floor, freshly-scrubbed at regular intervals, radiates an atmosphere of orderliness that has brought about a definite saving in stock and tools. Such cleanliness and orderliness gives the plant an attractive appearance and impresses the better-class mechanic as being a good place to work. The necessity for keeping machine parts, stock, and tools off the floor has also resulted in a lower accident rate. Altogether the improvement in the general plant conditions has been sufficient to justify the expense of the new equipment.

Mr. Kilzer states that the entire establishment has benefited by the inauguration of the weekly cleansing program. The employes generally have taken an interest in better housekeeping methods, the plant is in better condition, and the actual cost of keeping the plant clean has been reduced considerably. The cost of scrubbing the floor by the use of the equipment described above comes to slightly more than a cent per square foot for a year, which represents a saving that has more than paid for the equipment.

Control of Warping

(*Continued from page* 9)

furnace is constructed of fire brick of an extra large type, which happened to be available.) After the job was finished, a re-check with the spirit level showed that it had settled about one degree out of line. However, by checking the shaft in a lathe, it was found that the shaft had not warped the slightest amount.

Warping is often caused by uneven heating during preheating and uneven cooling after welding. If one portion of a casting, especially a portion consisting of light cross-section as compared to the balance of the casting, is heated to a point that will expand it while the balance of the casting is still at a much lower temperature, warping will be hard to prevent. Such a condition is the result of heating the casting too rapidly. This uneven heating has also been known to be caused by placing the brick walls of the furnace so close to the casting that proper circulation of the hot burnt gases and even combustion of the fuel was prevented. Similar conditions can be caused by cooling the casting too rapidly. After the welding operation has been completed, all openings in the brick wall around the casting, no matter how small, should be tightly closed to prevent cold air from entering the furnace and either chilling or cooling parts of the casting too rapidly.

Designed *for* Cutting Gears But Capable *of* Manifold Application

THE Gear Shaper Cutter as applied on the Fellows Gear Shaper is not confined to the cutting of gear teeth. In fact, some of the most outstanding savings accomplished by the Gear Shaper Method have been on work in no way associated with gearing.

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GEAR SHAPERS

A Graphic Reminder of the Cost of Waste

THE workman who is accustomed to being handed tools simply for the asking, or who is accustomed to seeing quantities of bolts, nuts, and other engine or car parts with which he works is prone to remember only that the supply seems unlimited and to forget that each piece of material, or each tool, represents a definite amount in dollars and cents.

In consequence, too often is a part allowed to lie where it falls, or is used to serve a purpose for which a piece of scrap material would do just as well. Or an unnecessary chance is taken with a tool and the tool is broken.

At the Norfolk & Western shops at Portsmouth, Ohio, a graphic reminder that tools and materials cost money has been erected in the yards at a point where it can be seen easily and often. The reminder consists of a background, made of boards and painted black, upon which are fastened a variety of broken parts and tools with the market price of each part or tool listed beneath it. In this manner the men are made acquainted with the fact that each foot of lumber that is allowed to go to waste costs the company 3 3/10c, a pipe elbow costs 8c, a shovel handle costs 23c, a hand reamer costs $1.93, and a 15-ton ratchet jack costs $23.00. The educational effect achieved by the use of this board has been remarkable. It is doubtful that the same results could have been obtained by any other method.

The Use of Leather Belting in the Transmission of Power, I.

The first of a series of three articles on this subject. In this article the authors discuss the question of individual or group drive.

By PHILIP C. BROWN, GEORGE B. HAVEN, AND GEORGE W. SWETT *

THE application of power to machine tools as motorized groups presupposes the use of leather belting as a transmission medium. The individual drive may totally eliminate any further power transmission requirements, and, in any case, will make negligible any one item in such equipment. It is necessary, consequently, to determine the type of drive to be used before considering problems connected with the use of belting.

Careful analysis will disclose many advantages for group drive in economy of installation, operation, and maintenance in the majority of cases. This article attempts to bring out the economic and engineering features thus involved. In subsequent articles, the use, maintenance and special applications (short center drives) of leather belting will be discussed.

An analysis of the relative values between motorized group and individual drive requires technical engineering of a high order. This question has been thoroughly debated in the engineering magazines. We believe that the best and most thorough articles on the subject are those written by Robert W. Drake, Electrical Engineer, McCormick Works, International Harvester Company, Chicago, Ill., and published in 1923. A recent article published by Professor Haven of Massachusetts Institute of Technology reaches about the same conclusions. Fortunately, the subject can usually be divided into installations distinctly favorable to either group or individual drive.

In general, it may be said that in most cases individual drive is favored where convenience and appearance are paramount and group drive where costs play the leading part. This subject is concisely covered by Professors Haven and Swett in their "Treatise On Leather Belting," from which a large part of the material used in this series of articles has been abstracted.

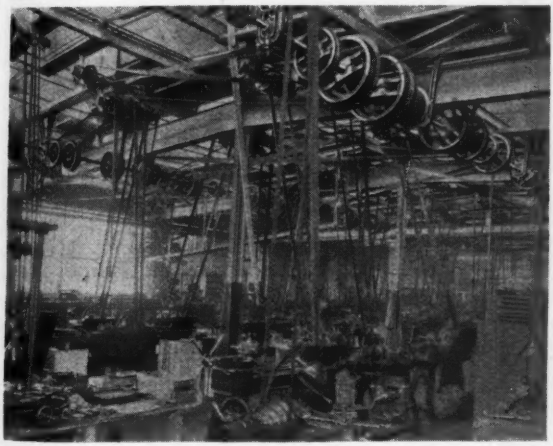
While large and important subdivisions of power may economically be carried out electrically, the final distribution to the machine is generally best accomplished by motors of substantial capacity operating belted group drives. In a large percentage of cases the latter system offers unequalled advantages, the character of which may readily be appreciated by careful consideration.

* George B. Haven is Professor of Advanced Machine Design and George W. Swett is Professor of Machine Design, both of Massachusetts Institute of Technology. Philip C. Brown is President of I. B. Williams & Sons, and Chairman of the Engineering Committee of the American Leather Belting Association.

Relative Value of Group and Individual Drive

Power distribution in modern engineering is usually accomplished electrically. The ultimate application to the machine is through either group or individual drive.

The installed capacity of motors necessary for individual driving is usually from two to three times that necessary for group driving. This means that if a group of ten machines were to be driven directly, each one being equipped with a 1 h.p. motor individually applied, the total motor capacity would be 10 h.p. If these machines were arranged in a group, driven by means of narrow high speed belts from a system of countershafts with one good-sized motor supplying power to the whole, the total capacity of such a drive need only be from 3 to 4 h.p.



Modern group drive in a well-lighted plant. A relatively small number of motors is required to drive all the machines in this room. The motors are mounted near the ceiling, away from the dirt and scrap on the floor.

The reason for this lies in the fact that the individual needs of the machines regarding starting torque, accelerations, idle intervals, and maximum and minimum loads would overlap in such a manner as to economize greatly in the total power required. This condition is sometimes expressed as the "diversity factor." Normally, the greater the number of machines driven in a group, the greater will be the "diversity factor." This means that the maximum demand upon a group-drive motor will usually become less and less with relation to the aggregate peak horse power required by individual units, the greater the number of machines. Obviously, in comparing these two types of drives, many other items must be considered, such as the cost of installation, maintenance and upkeep, repair, cleaning, and lubrication.

Variations In Electric Motor Efficiency

For constant-speed alternating current motors, the loss in efficiency of numerous small individual motors in comparison with that of one large motor for the same task ranges from 5 per cent to 7 per cent. This figure in general offsets the friction losses incidental to the countershaft and belts of the group drive. Thus as a matter of overall efficiency with alternating current motors there is but little choice between an application of numerous small motors and one sizeable motor including its necessary shafting.

The efficiencies of direct current motors at fractional loads are much lower than those of alternating current motors operating at the same horse power. Thus constant-speed

direct current individual drives will show much greater losses than either alternating or direct current group drives.

Relative Cost of Individual and Group Driving

The cost per horse power of motors, with accessories, for group driving is roughly from twelve to fifteen dollars per horse power. This includes moderate installation costs and is a fair figure for the average age group-driving system. The corresponding figures for small individual drives of the same aggregate horse power vary from fifteen to fifty dollars per horse power. Considering the greater installed capacity required for the individual drive, as mentioned above, the ratio of cost, including only the item of motors and accessories, would be roughly fifteen dollars per horse power for the group motor in comparison with sixty to seventy-five dollars for the individual drive.

The cost of maintenance and inspection for each small motor amounts to almost as much as for one large one. While the cost of repairs increases somewhat with the size of the motor, this item is by no means proportional to the size of the unit.

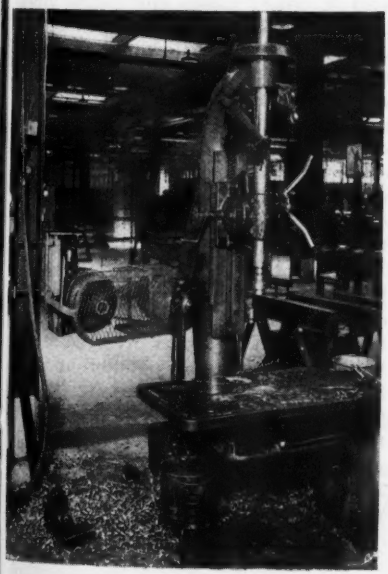
Comparative Cost Per H.P. of Different Sized Motors For Given Total Capacity

A-C Motors, 60 Cycle, 3-Phase, 550 Volts, with Starters, 1,800 R.P.M.

Motor Rating	Motor Cost	Cost per H.P.
One 50 H.P. motor.....	$ 440	$ 8.80
Five 10 H.P. motors.....	$ 570	$11.40
Ten 5 H.P. motors.....	$ 780	$15.60
Fifty 1 H.P. motors.....	$2,600	$52.00

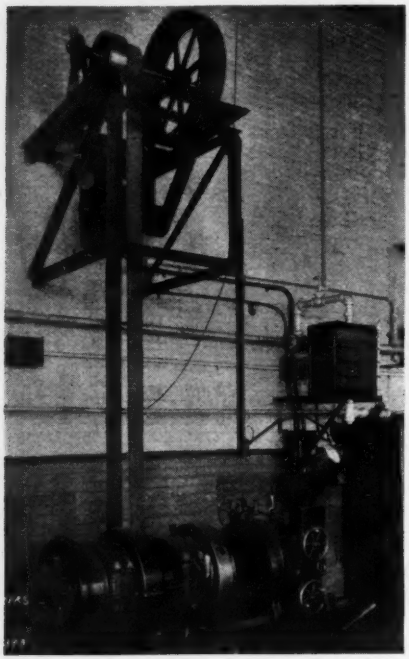
The cost of installation of individual drives when carried to an extreme will often reach from two to three times that of a well-designed group drive. An individual motor installation generally demands a method of speed reduction. This is accomplished at considerable expense by various systems such as chains, cut gears, and mechanical speed changers. In some cases the cost of such an installation may reach as high as five times that of an equivalent group drive. In addition to this, the operating expenses of numerous individual drives will generally exceed by 50 per cent that necessary for a well-planned distribution with one large motor.

Lastly, the cost of the motors alone is interesting as a comparison of the expense of these two types of driving.



Drill press being driven by motor mounted on a pillar, thus keeping it clear of chips and dirt. Rockwood drive is used, with pulleys 3 in. to 12 in. diameter on a 9-in. center distance. Belt is 4-in. single leather, endless.

In the light of the above table, one of the most difficult conditions to be overcome in the individual drive is the tremendous amount of capital necessary in the original outlay for so many small motors.



Interesting arrangement of a Rockwood drive, involving the use of a wall mounting with jack shaft. A pipe machine is being driven by a 10 h.p., 900 r.p.m. reversing motor through pulleys of 8 in. to 36 in. diameter.

It is sometimes claimed that the machine driven by an individual motor gives greater production than the same machine in a group drive by one motor. If true, this is the fault of the group drive design and equipment, and not that of the system. With proper installation there is no reason why a group drive may not be as efficient as the individual. Of course, there are cases where large or isolated machines or those used only occasionally, should be individually driven.

In spite of the cost advantage of group drive, there are (particularly in a machine shop) many machines and situations that reverse this cost advantage. Such situations are those where overhead crane service interferes with shafting or belts; or where large machines with even and uniform loads occur, or machines not in constant use; and lastly, machines that may be moved from time to time or that may be desired set up at odd angles and places. The list of such loads favorable to individual drive looks impressive, yet in the great majority of cases, costs of installation, maintenance and operation determine group drive as the logical equipment.

The group drive with leather belt has other advantages than lower cost. It provides a flexible medium between the driver and the driven which will absorb shocks. This may be absolutely essential to the life of the driven machine. Leather belt drive also in many cases eliminates vibration (often known as chatter) in machine tools. Some lathe work of the finest precision is impossible with direct drive. These advantages are, of course, negligible compared to the shock absorbing feature of a flexible drive. If a machine jams or reaches a load beyond its capacity, a belt will slip or run off before the machine is broken and destroyed.

In considering the advantages of the motorized group drive, the technical development in recent years of the transmission mediums involved should be given due credit. Roller and ball bearing shaft boxes have tremendously reduced friction losses. Instruments for aligning shafting leave no excuse for undue loads and stresses in a well engineered and modern shop. Last, but by no means least,

(*Continued on page 26*)

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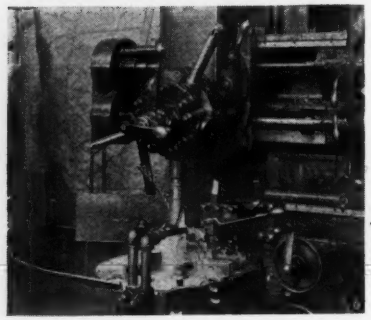
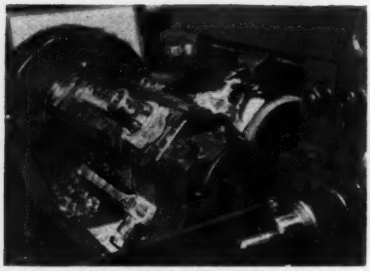


Courtesy of The Bullard Company, Bridgeport, Conn.

OPERATION: DRILLING AND TURNING PINION.
MACHINE: BULLARD VERTICAL TURRET LATHE.
MATERIAL: CHROME NICKEL STEEL.
SPEED: 85 FEET PER MINUTE. 70 R. P. M.
FEED OF DRILL: .007 INCH PER REV.
2½ INCH DRILL.
BEVEL SWEEP: .014 PER REV.
LUBRICANT: 1 PART SUNOCO TO 20 PARTS WATER.



Courtesy of Cincinnati Milling Machine Company, Cincinnati, Ohio.

OPERATION: MILL BOLT BOSSES AND SAW OFF CAP. ON CONNECTING ROD
MACHINE: NEW 3-24 PLAIN CINCINNATI HYDROMATIC MILLER
MATERIAL: STEEL FORGING
STOCK REMOVED: ⅛ INCH AND SAW
CUTTERS: TWO 6⅝ IN. DIAMETER HALF SIDE MILLS. ONE 7 IN. BY $\frac{5}{16}$ IN. SAW 1 SPECIAL ARBOR
CUTTER R. P. M.: 28
FEED: VARIABLE. 7½ INCH AVERAGE.
PRODUCTION PER HOUR: 180 RODS
LUBRICANT: 1 PART SUNOCO TO 20 PARTS WATER

You spend thousands of dollars for modern equipment to meet the demands of low-cost production—you spend time and money in equipping these high-speed Machine Tools with the latest developments in tool steel and metalloid small tools.

Oftentimes this expenditure of time and money is nullified if you burden your metal-cutting machines with cutting lubricants that are inefficient.

While the cutting lubricant represents but a small percentage of production expense it nevertheless exerts a surprisingly important effect on the ultimate cost of production.

Savings in the cost of production can be made by purchasing cutting lubricants on their specified performance rather than on a cost basis or chemical analysis.

The use of Sunoco Emulsifying Cutting Oil on the modern Machine Tool has a direct influence on the productive capacity of the machine. Higher speeds and feeds to take full advantage of the latest developments in cutting tools, longer runs per tool grind, less lost time

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EMULSIFYING

Made by SUN OIL CO. *producers*

Akron, Albany, Allentown, Atlantic City, Baltimore, Battle Creek, Boston, Dallas, Dayton, Detroit, Flint, Grand Rapids, Harrisburg, Jackson, (Mich.) burgh, Providence, Reading, Rochester, Scranton-Wilkes Barre, Syr

Tool Efficiency *and* of Production . . .

in re-setting, reduced tool maintenance, maintained accuracy, less spoilage and better finish are factors that induce Machine Tool Manufacturers to use and recommend Sunoco.

Leaders in the metal-cutting industry know that the uniform performance of Sunoco will permit accurate predictions on the quantity of work that their machine tools will produce.

Perhaps you are unacquainted with the merits of Sunoco and do not realize the decided advantages that can be obtained through its use in enabling your machines to attain a smooth finish at a high rate of speed.

A trial in your plant under your own working conditions will convince you that Sunoco will aid in stepping up your production to a new high standard.

The Sun Oil Company produces a type of cutting oil to meet every metal-cutting requirement.

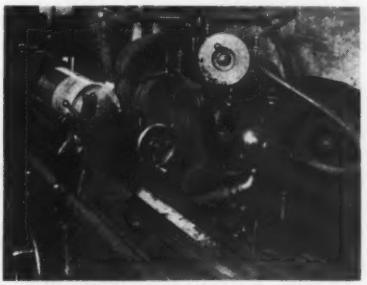
SUN OIL COMPANY, Ltd., Montreal, Canada.

SUNOCO CUTTING OIL
and BLUE SUNOCO MOTOR FUEL

Akron, Bridgeport, Buffalo, Chicago, Cincinnati, Cleveland, Columbus, Jacksonville, Miami, Montreal, Newark, New York, Philadelphia, Pittsburgh, Tampa, Toledo, Toronto, Trenton, Tulsa, Wilmington, Youngstown.

Courtesy of Cincinnati Milling Machine Company, Cincinnati, Ohio.

OPERATION: MILLING KEYWAY ON SHAFT.
MACHINE: NO. 2 CINCINNATI MILLING MACHINE.
MATERIAL: STEEL FORGING.
CUTTER: 4 IN.—51 R. P. M.
FEED: 3½ IN. PER MIN.
WIDTH OF CUT: ½ IN.
DEPTH OF CUT: 3⅛ IN.
LUBRICANT: 1 PART SUNOCO TO 20 PARTS WATER.



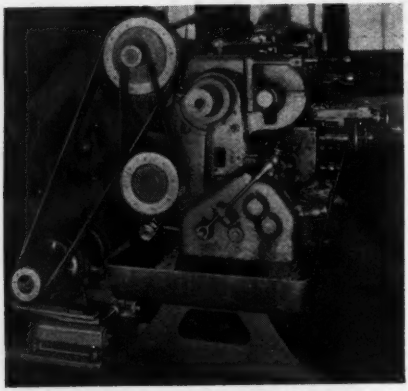
Courtesy of Carborundum Company, Niagara Falls, N. Y.

OPERATION: GRINDING STEEL ROLL. 9 IN. DIAMETER 18 IN. LONG
MACHINE: LANDIS ROLL GRINDER 12 IN. X 72 IN.
SCLEROSCOPE: 94 TO 101
WHEEL ROUGHING: 36-9-C9R
FINISHING: 120-6-C6Y
POLISHING: 400-10-C10Y-
18 IN. X 1½ IN. X 8 IN.
METAL REMOVED: ROUGHING .0015 IN. PER PASS. FINISHING .0005 IN. PER PASS.
WHEEL SPEED: 1700 R. P. M.
WORK SPEED: 40 R. P. M.
LUBRICANT: 1 PART SUNOCO TO 30 PARTS WATER

Use of Leather Belting

(*Continued from page 22*)

leather belt has been developed until there is a proper installation for each drive which should be determined by



Double reduction through two belts. The first belt is from motor mounted on Rockwood base, floor mounting position, well off the floor. Automatic tension control which can be adjusted to suit the load.

a careful engineering study of each case. Speeds, size of pulleys, arc of contact, loads, and so on, should all be considered.

In succeeding articles, we will assume that motorized group drive has been selected as the desired type of drive from both economic and engineering considerations.

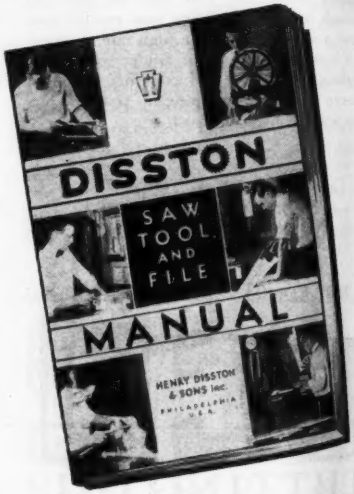
Ideal Issues Synchronous Motor Bulletin

A 16-page bulletin on synchronous motors has been issued by The Ideal Electric & Mfg. Co., Mansfield, Ohio. The bulletin includes complete descriptive matter, application data, and dimension charts covering the Ideal Flywheel Type Synchronous Motor and six other standard types of synchronous motors. A variety of Ideal motor installations are shown.

An unusual method of giving dimensions is used, making it possible for the reader to obtain approximate dimensions of any of the various types of motors for any horsepower and speed rating. Two tables are given for each type of machine, the first giving frame sizes and dimension key according to horsepower and r.p.m. rating, and the second giving the dimensions corresponding to the frame sizes and dimension key just determined. Copy sent upon request.

Disston Saw, Tool, and File Manual

A 48-page book of instructions on the use and care of saws, files, squares, and other tools has been issued by Henry Disston & Sons, Inc., Tacony Sta., Philadelphia, Penna. The book tells and shows each step necessary for the production of accurate work, 229 illustrations being included to make clear the points brought out in the text. An entire section of the book, for instance, is devoted to the hack saw, giving instructions for selecting the correct type of blade for any class of work, holding the work in the vise, and for cutting metals and other materials most efficiently with minimum breakage of blades. Another section takes up in detail the correct use of files. Every

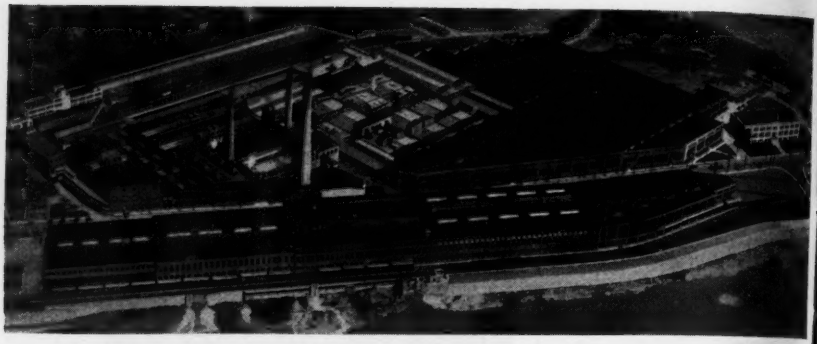


possible use of the wood and metal saw, either for hand use or for power machine use, comes in for thorough discussion.

A brief history of the saw industry, together with a sketch of the development of the Disston works, is included. A copy of the book will be sent without charge to any mechanical executive.

FORMICA GEAR CUTTERS

The Akron Gear & En'g Co.
Akron, Ohio
Farrel-Birmingham Co., Inc.
Buffalo, N. Y.
Slayman & Company, Baltimore, Md.
Harry A. Moore, Bangor, Me.
The Union Gear & Mch. Co.
Boston, Mass.
The Atlantic Gear Works
Brooklyn, N. Y.
Chicago Rawhide Mfg. Co., Chicago, Ill.
Perfection Gear Company, Chicago, Ill.
Chicago Gear Company, Chicago, Ill.
The Cincinnati Gear Co., Cincinnati, O.
The Clarksville Foundry
and Machine Co., Clarksville, Tenn.
The Horsburgh & Scott Co.
Cleveland, O.
The Stahl Gear & Machine Co.
Cleveland, O.
The Master Electric Co., Dayton O.
The Adams Company, Dubuque, Ia.
Hammer Machine Works
Fort Smith, Arkansas
Austin Machine Co., Fort Worth, Tex.
The Ferguson Gear Co., Gastonia, N. C.
Hartford Special Mchny. Co.
Hartford, Conn.
Precision Machine Co., Milwaukee, Wis.
Joaquin Alemany Lopez, Havana, Cuba
The Dedman Foundry & Machine Co.
Houston, Tex.
The Generating Gear Co.
Milwaukee, Wis.
H. C. Brelie, Milwaukee, Wis.
The E. A. Pynch Co.
Minneapolis, Minn.
Mobile Pulley & Machine Works
Mobile, Ala.
Berkley Machine Works & Foundry Co.
Norfolk, Va.
Empire Machinery & Supply Corp.
Norfolk, Va.
Meisselbach Catucci Mfg. Co.
Newark, N. J.
Sier-Bath, Inc., New York City, N. Y.
E. M. Smith Machine Shop
Peoria, Ill.
The Earle Gear & Mch. Co.
Philadelphia, Pa.
Rodney Davis and Sons
Philadelphia, Pa.
Lamont Gear & Mch. Co.
Philadelphia, Pa.
The Pittsburgh Machine & Supply Co.
Pittsburgh, Pa.
Standard Gear Co., Pittsburgh, Pa.
The Turley Gear & Mch. Co.
St. Louis, Mo.
Perkins Machine & Gear Co.
Springfield, Mass.
Winfield H. Smith, Inc.
Springville, N. Y.
Ailing Lander Company, Sodus, N. Y.
Charles E. Crofoot Gear Corp'n
South Easton, Mass.
Arlington Machine Co., St. Paul, Minn.
Diefendorf Gear Corp., Syracuse, N. Y.
Worcester Gear Works, Worcester, Mass.
Massachusetts Gear & Tool Co.
Woburn, Mass.



Machine Tools Aid in the Making of Paper

THESE views in the machine shop of the Champion Coated Paper Company, Hamilton, Ohio, indicate the important part played by the "master tools of industry" in the making of paper products. Such an immense plant uses a large amount of equipment, and constant care is required to maintain it in the excellent condition necessary to turn out the high-grade product for which this firm is noted.

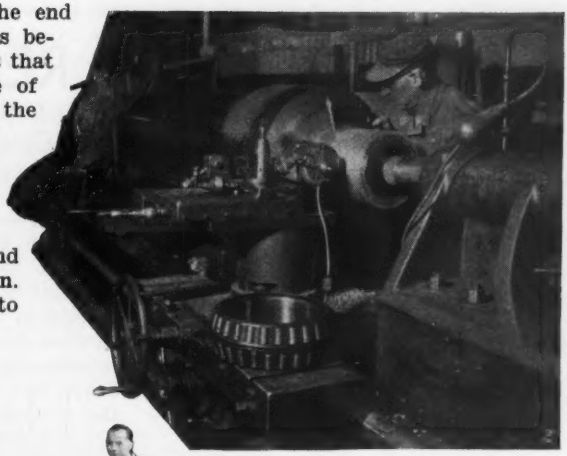
An aerial view of the Champion Coated Paper Company's plant is shown above. Below, in Fig. 1, is shown a battery of lathes. In the foreground is a mechanic in process of balancing, dynamically, a roll for a calendering machine. This Globe dynamic balancing machine is used to balance all rolls used in the paper-making and calendering machines.

Figure 2 shows how a big lathe is converted into a cylindrical grinder by the use of a tool-post grinding attachment. Here the journal on a calender roll is being ground to size for the Timken bearing shown on the carriage.

The operation in process in Fig. 3 is that of grooving a roll for a winder drum. The point of interest here is the manner in which the spiral movement is

obtained. An arm on the end of the roll shaft projects between the two guide-rods that are attached to the side of the planer so that, as the table moves forward and back, the roll is revolved the correct amount.

In Fig. 4 are a milling machine, shaper, horizontal boring machine, and radial drill, all in operation. The radial is being used to drill a perforated roll for a Fourdrinier paper machine head-box, and the other machines are in process of making new parts for the various machines used in the making of paper. Machine tools make possible such great industries as this.



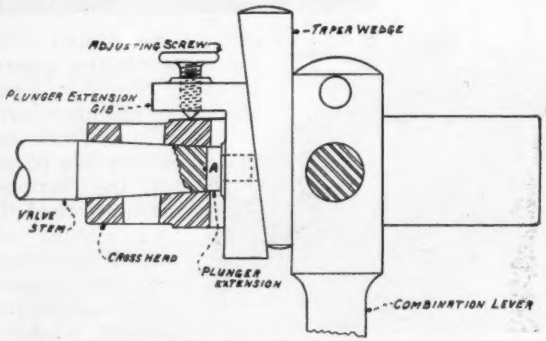
IDEAS FROM READERS

This department is a clearing house for ideas . . . If there is a "kink" or short cut in use in your shop, send in a description of it . . . We will pay $5 for each one published.

Extractor for Piston Valve Stems

By H. H. HENSON

IT HAS become common practice on many of the larger railroads to extract the locomotive piston rods and valve stems from their crossheads, every three months, and hammer test the taper fits for cracks. Because of the tight fits and the fact that the crossheads are so designed as to make the stem ends inaccessible to a hammer, some sort of an extractor is required to loosen and remove them.



Gib and Taper Wedge for Extracting Piston Valve Stems

The drawing shows the design of an extractor that works very efficiently. It consists of three tapered members—a gib, a wedge, and a plunger extension. The design of the gib is L-shape, the horizontal section carrying a screw by which the gib is adjusted for height. Near the center of the vertical section of the gib is a hole to receive the tang of a plunger extension which is made with a head A. The heads are of varying thickness and a number of extensions are carried in stock to accommodate the various dimensions of the clearances between the inner faces of the crossheads and the combination levers of the several types and makes of locomotives. Each plunger is provided with a "teat" that guides it by entering the center hole in the end of the valve stem.

With the taper wedge and gib in place as shown in the illustration, a few blows on the upper end of the wedge will dislodge the valve stem.

Ball Bearing Pin Center

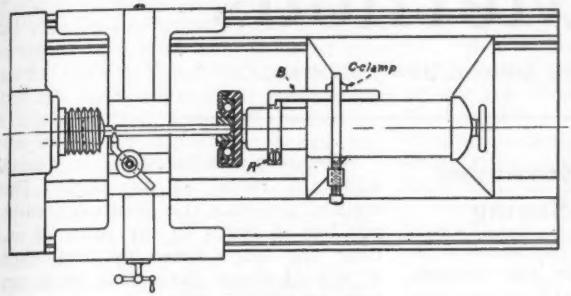
By WM. BETZ

WE HAVE found it necessary, occasionally, to cut off quantities of small pins, while at the same time the quantities were not large enough to make it pay to set up an automatic screw machine for the job. In such cases, a ball-bearing center with a stop gauge, designed especially for the engine lathe, has been found useful.

The ball bearing is pressed into an adapter that is made with a taper shank to fit into the center hole in the tailstock. To accommodate the free end of the stock, a bushing is used that is a slip fit over the stock

and is a light tap fit in the inner bore of the ball bearing. Bushings of various bore sizes are made to fit the different sizes of stock.

A stop **A** gauges the distance that



Ball Bearing Pin Center

the tailstock spindle may be drawn back to release the cut pin. The piece **B**, by which the stop is held, may be fastened to the tailstock with a clamp, as shown, or it may be permanently attached to the tailstock by means of screws. In the latter case, the screw holes in the piece **B** should be elongated for adjustment.

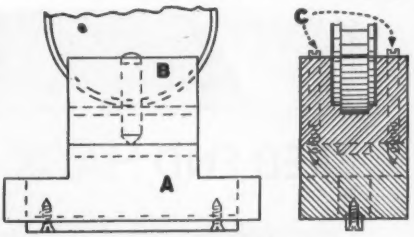
Gage Saves Time in Setting Tools

By CHARLES R. WHITEHOUSE

WHERE machining operations are performed on parts in large quantities, necessitating the changing of cutters several times before the lot is completed, time can be saved by the use of a tool setting gage such as that shown in the illustration. Ordinarily the operator has to spend a considerable amount of time adjusting the cutters, measuring, trying the cutters on a piece of work, and so on every time the cutters are changed. By using a gage block, it is necessary only to line up the cutters with the groove in the block.

The gage block consists of a cast iron base **A** to the top of which is attached a steel block **B**. The block is held to the base by a tongue and groove and by the screws **C**. The block is anchored to the machine table in line with the milling fixture so that a slot through the middle of the block **B** will be in exact alignment with the cutters. The slot is of the correct dimensions to admit a gang of mills, as shown, with room for a 0.015-in. feeler on each side and underneath. Thus when a new set of cutters is placed on the arbor, it is only necessary to line them up in the gage block to locate them in the correct position for the work. In some cases the time of changing and setting cutters has been reduced 75 per cent. Spoilage is also reduced, as no parts are spoiled in "cutting and trying."

When such a block is once used and the advantages discovered, many variations of the block will occur to the designer, such as the use of a gage



Tool-setting gage

block inside a fixture where the use of the block on the machine table would not be so practical. In such an instance it will, of course, be absolutely necessary that the center line of the gage be aligned with the center line of the fixture.

(Continued on page 34)

Metal Cutting Methods

By SIMONDS SAW AND STEEL CO.

Something To Remember About Hack Sawing

WHEN cutting thin metal, use a Red End Hack Saw fine enough so that two or more teeth engage the work at the same time, otherwise the cutting-edge may be stripped if the metal catches between the teeth.

Whenever possible, saw sheet metal with the blade at an angle. This method presents the greatest possible number of teeth to the work at one time and helps speed up production. It is important that your hack saw teeth be of the right temper and that the blade have the right number of teeth for the kind of metal you wish to cut.

When You Put the "Rainbow" To Work

SIMONDS put the "Rainbow" to work when scientific developments and practical operation gave positive assurance of a hack saw blade of unexcelled quality. That is why the brilliant red trade marks tell mechanics at a glance that Simonds quality is built into every blade that bears the "Red End" or "Red Back Edge."

Whatever kind of metal you cut, it is good sense to consult a Simonds representative to help you check up before you order a saw. A Simonds man will give you the straight dope on the kind of saw you require—cold saw, metal band, hack saw. It may make a lot of difference and help you reduce metal cutting costs.

This Saw Cuts Six Inches of Metal In One Minute

"THEY cut fast and hold their edge on the most difficult metal sawing," is the way users tell the story of the new Simonds curved gullet saw. To illustrate:—two of these saws operating on machines of a well-known make gave such satisfactory performance that the superintendent sent us a record. One saw, cutting 7⅛" round stock, cut at the rate of 1½" per minute while the other, cutting a different steel, sliced through the stock at the rate of 6" per minute. These were the Simonds Red Streak Inserted Tooth Saws with the curved gullets. Both speed and feed of the machines were increased and the blades showed little evidence of dulling when the job was completed. This record shows the cutting and lasting qualities of Simonds Inserted Tooth Saws.

Simonds Saw and Steel Co.
FITCHBURG, MASS.

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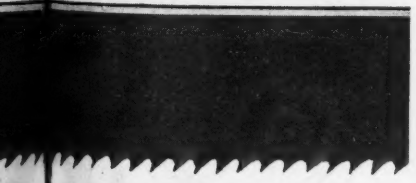
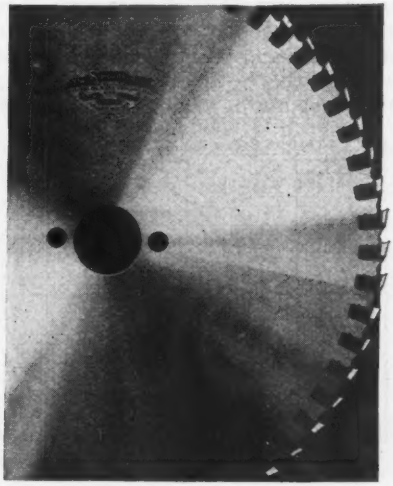
WSRE THE BEST

he bri e mark—The High Tungsten Blades
shell to



EL uction blade that gives ten times ervice than other hack saws.



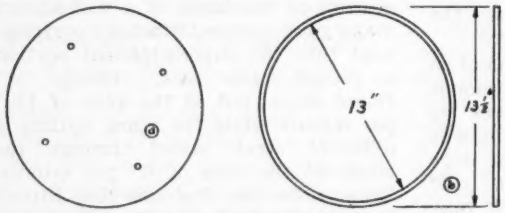
Ideas From Readers

(*Continued from page 31*)

Making Special Washers in the Lathe

By RICHARD H. KIDDLE

WE recently had a call from a local physician to make a number of special washers for use in X-ray apparatus. The washers were to be made from 28 gage sheet steel, to the dimensions shown in the drawing.



(a) Outline of blank showing bolt-holes for bolting to faceplate. (b) Dimensions of finished washer.

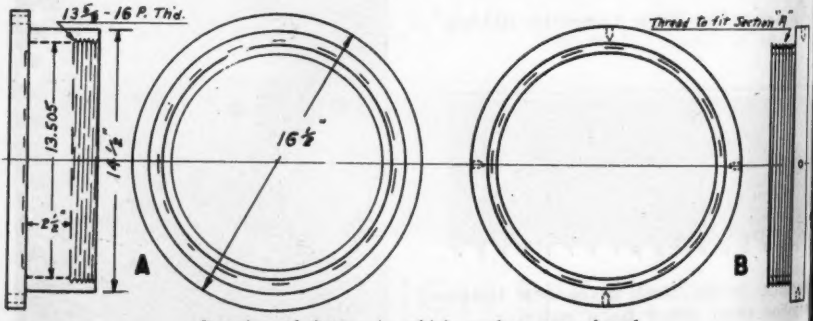
In order to make the washers as quickly and cheaply as possible, we decided to turn and bore them in the lathe. The 13½-in. circles were first laid off on the sheets with a compass and the discs were roughly sheared out with snips. These discs were then clamped together on the table of a drill press and four holes were drilled so that the discs could be bolted to the faceplate of the lathe and turned to size. We then made a chuck, which, fortunately, we were able to make from a casting that was found in the scrap pile. The chuck **A** was bored just large enough to take the discs, and the bore was threaded to receive a piece that could be screwed in to hold the discs firmly while the boring operation was taking place. Holes in the "head" of the inner section **B** provided for the use of a spanner wrench with which the piece could be tightened in place. We bored 10 discs at a time, and the finished pieces were practically perfect as to size and finish. The warpage was so little as to be immaterial. Thus we were able to make the 50 washers quickly and accurately, and without the use of an expensive punch and die.

Testing Lead of Threads

By CHARLES KUGLER

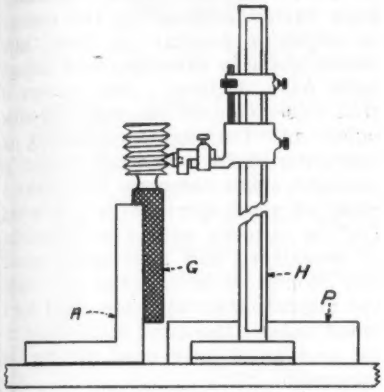
THE drawing illustrates a method by which the lead of a thread can be tested with a height gage, in cases where a thread pitch gage is not available.

The thread gage or screw to be tested (indicated as **G**) is clamped vertically in a V-block or in a vertical



Drawing of fixture in which washers were bored.

groove that has been cut in an angle plate, indicated as **A**. A 60-deg. cone is attached to the height gage **H** and the gage is set so that the point of



Drawing illustrating use of height gage for measuring lead of thread.

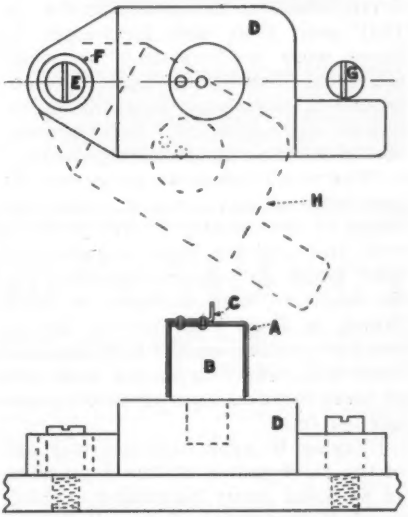
the cone is even with the center line of the thread gage, as shown. A parallel (**P**) should be used to keep the height gage lined up with the gage to be tested, the parallel being clamped to the surface plate. The cone can be fitted into the angles of several threads in turn and the dimensions between the threads noted. The writer has found this method of measuring thread leads to be the best because it works equally well with all pitches, which cannot be said for many of the gages used today.

A Safe Swinging Fixture For Riveting

By L. G. PATTERSON

THE drawing shows the design of a swinging fixture that is used for the operation of riveting a clip on a bucket. In use, the bucket **A** is slipped into position over the adapter **B** and also over the two rivets. Recesses are provided in the adapter **B** for the heads of the rivets. The clip **C** is then placed in position and the rivets are headed by the ram of a press, on the table of which the fixture is anchored.

The adapter is located on a swing block **D** which turns on the hardened and ground pin **E**, thus allowing the block to be swung clear of the ram of the press and making it safe and easy to load and unload. A hardened and ground bushing **F** is pressed into the block to reduce wear to the minimum. A stop **G**, consisting of a hardened and ground steel screw, is provided in the bedplate to aid in locating the swing block instantly when ready to



A safe swinging fixture for riveting

operate. The loading position of the block is indicated by the dotted line **H**.

Over the Editor's Desk

SMALL plant organizations that have been laboring under the handicap of an inferiority complex can now square their shoulders and lift their chins, according to a recent statement by Roger Babson, well-known economist. The small plants are now leading their overgrown brothers in the matter of profit-producing business, and may continue to lead until we are well on the road to normalcy.

Mr. Babson says "Out of 1,500 well-known industrial companies, only fifty-seven showed increased profits in 1931 over 1930, and forty-eight of these were medium-sized or small concerns. This proves that the moderate-size business, capably managed, can be more successful under present conditions than the giant corporations.

"The small business man is still the backbone of this country. The majority of the country's total goods is still produced by small manufacturers. While the large corporations can do much to help business by such drives as Ford and General Motors are now putting on, the real improvement will come only as the multitude of small business men substitute courage for fear.

"Trying to grow too fast was one of the chief causes of this depression. In so doing many businesses over-expanded, over-produced, over-built, and over-speculated on the future. As a consequence, many big corporations grew unwieldy, top-heavy with expense and wide open for trouble when the boom stopped. Medium-sized and small concerns can make rapid readjustments to depression conditions. They are more flexible; they can adapt their products to changing demands without the enormous costs entailed by the big corporations.

"In studying reports that have come to me from many small concerns, I have been impressed by the manner in which a number of them have scored gains in earnings, even though sales have declined. One reason is that closer control has made possible quick and thorough overhauling of operating costs. Another reason is that the small company can make a profit on small special orders, whereas the big concern with a vast amount of machinery and floor space would lose money on such orders. It costs too much to start up a big plant for a small order. More and more these little companies have been getting the business.

"My advice to the small business man is to get rid of any inferiority complex he may have acquired because of big corporation competition. He should now wake up to the advantages he now possesses over the big competitor. Also, he should carry this same message to his employes. Let them know that the small company for which they work has a chance just as good and perhaps better than the big industrial giant for making a strong comeback in sales, earnings, and general recovery. This will do more than anything else to help the morale of the workers and secure their whole-hearted co-operation in any sacrifices necessary to accomplish the desired results.

"The greatest lesson of the depression is: 'Be satisfied with less speed.' Build solidly, even though slowly; maintain quality at low cost even though the temptation be strong to make cheap goods. In this way, by playing fair with the public, with employes and with competitors, the small and moderate-sized concern can turn the depression into the keystone of its future success."

NEW SHOP EQUIPMENT

36-In. Rotary-Type Vertical Mil-Waukee-Mil

A rotary-type vertical milling machine, developed for high-production manufacturing purposes, has been announced by the Kearney & Trecker Corporation, Milwaukee, Wisconsin. The machine embodies the strength and rigidity—together with the high speeds and fast feeds—necessary for the application of tungsten and tantalum carbide cutters as well as cutters made from other materials. Such operations as face, side and straddle milling, slotting, form cutting, and the finishing of radial faces, are among the classes of milling that can be handled in the machine.

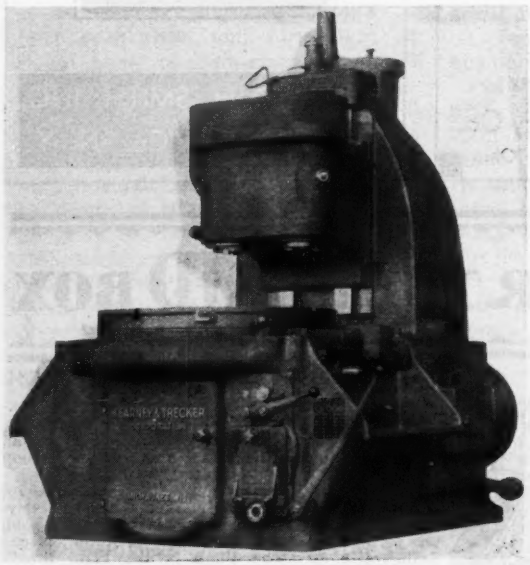


Fig. 1—36-In. Rotary-Type Mil-Waukee-Mil with Double-Spindle Head.

An outstanding feature of the machine is the worm drive to the table. The table is 36 in. in diameter and is driven by a large, heavy wormwheel, almost equal in size, which is mounted solidly on the bottom side. Table feed changes, of which there are 18, are by means of pickoff gears. Changes are made at the feed-change box, which is conveniently located at the front of the machine next to the control levers. A table feed ratio of 40 to 1 is provided so that the full benefits of tungsten carbide may be gained even in cases where the cut is light in nature, or where the material being machined is soft, such as aluminum, and where unusually fast feeds are desired.

The table has two feed rates, one normal and the other power rapid traverse. In operation, the table can be fed at the selected feed rate through the cut, then it can be engaged into rapid traverse at the rate of 240 inches per minute to the next station, after which the normal feed is again engaged.

Table control is by means of two levers—one at the right adjacent to the table for directional control, and one at the front of the bed for selecting the table movement, either feed or power rapid traverse. Either a single or double spindle head may be furnished as desired. The head illustrated in Fig. 1 has two spindles, one of which is mounted in a quill with ample adjustment to compensate for cutter wear. Special heads with one or more spindles in any position or combination may also be obtained. Speed changes for the head are by means of pickoff gears located in the box at the top of the upright. Spindle speeds are furnished in any one of four optional ranges of 15 to 150; 20 to 200; 30 to 300; or 50 to 500. There are 18 speed changes to each range. The spindle control lever is

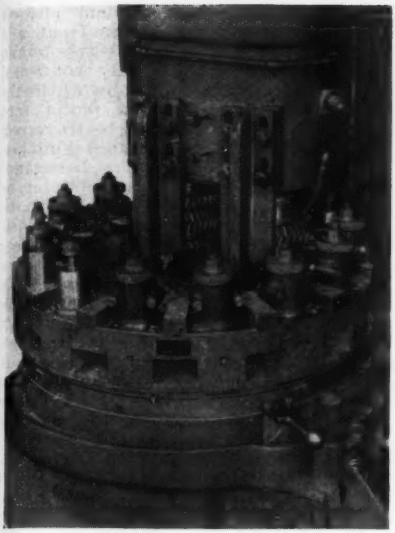


Fig. 2—Straddle-Milling Bosses on Forged Steel Spring Seats.

located at the front of the machine, at the right side, thus grouping the three controlling levers for convenient operation at the normal loading position.

The capacity of the machine is as follows: Vertical adjustment of spindle, 10 in.; maximum distance face of spindle to top of table, 14 in.; minimum distance face of spindle to top of table, 4 in.; cross adjustment of head, 8½ in.; maximum distance centerline of table to centerline of spindle, 16½ in.; minimum distance centerline of table to centerline of spindle, 8 in.

The machine bed has two large reservoirs, one for the cutter coolant supply and one for oil lubrication. The entire machine is automatically lubricated.

An application of the machine is illustrated in Fig. 2, which shows the milling of forged steel spring seats. The cut constitutes the straddle milling of two bosses. The cutters mounted on the spindle at the right rough the faces and the others finish them.

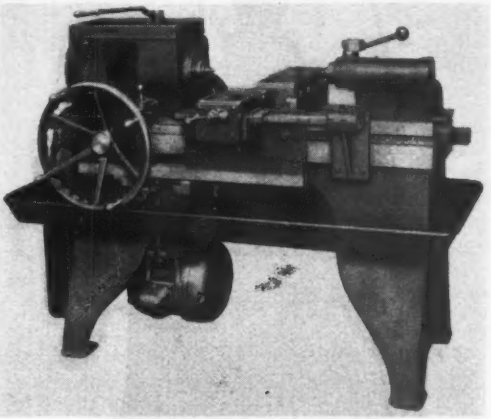
The fixture, holding 14 pieces, is mounted on the rotary table. The pieces are first placed on the plugs, then C-washers are put on, after which the nuts are tightened securely. Rotation of the table is continuous. The operator loads and unloads at the front of the fixture, while the pieces at the rear are being milled. Production averages 65 pieces per hour. For this setup outer supports for the arbors are mounted on the two-spindle head.

Sundstrand "Junior" Stub Lathe

The illustration shows the Sundstrand "Junior" Stub Lathe, which has been designed by The Sundstrand Machine Tool Co., Rockford, Ill., to meet modern requirements for processing work rapidly. It is said that the machine has the strength, weight and rigidity to apply effectively 2½ to 3 times the power usually found in a machine of this type, and the speed and feed ranges are suitable for the use of cemented carbide tools.

The headstock and bed of the machine comprise a single strong, rigid casting. The cover plate provides ready access to the entire headstock, and when in position forms a convenient tool tray. A large coolant tank is cast in the leg, and an ample reinforced steel chip and coolant pan is provided.

The spindle is extra large and strong, and is machined inside and out for perfect balance. It is mounted in matched



Sundstrand "Junior" Stub Lathe.

anti-friction bearings. The anti-friction tailstock is exceptionally heavy, with a wide, solid bearing on the bed. The large quill is readily adaptable to power operation. The machine is equipped with a heavy front carriage, with liberal, accurately-fitted bearings on the bed and carrying a proportionately strong tool slide adaptable to a wide range of work. A heavy rear carriage is also provided, manually adjustable on the bed. The slide is actuated by a drum cam which affords excellent control and adaptability of feed movement, including dwell. The front carriage and rear slide can be operated, in unison, by means of a large handwheel.

A cam bar attachment provides for automatic rapid approach of front tools to the work, and for form and taper running. The attachment is anchored to a bracket that is adjustable on the bed to facilitate setting.

Provision is made for mounting non-rotating air cylinders or other chucking equipment, and a large hole through the spindle provides for draw rods.

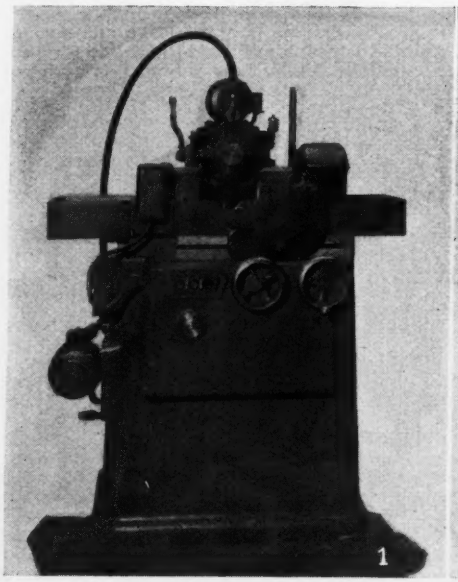
Spindle speed changes are obtained through pick-off gears which have taper seats for secure mounting and smooth, quiet operation. Independent pick-off gears are also provided for front and rear tool feeds. The spindle speeds and the feeds are automatically controlled through an adjustable dog by which the spindle is started and the power feed engaged as the carriage is traversed. The spindle mechanism, feed clutches, and brake can be engaged or disengaged by means of a master control lever on the top of the headstock. An automatic tool relief attachment is also provided.

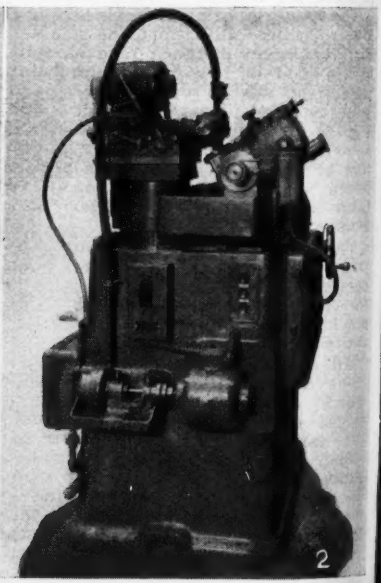
The capacity of the machine between centers is 18 in. Swing over bed ways, 12 in. dia. Swing over tool slides, 8 in. Spindle dia., 2⅜ in. Taper in spindle nose, No. 5 Morse. Front carriage feeds, standard, 0.0015 to 0.042 in. Special, 0.003 to 0.084 in. Spindle speeds, 128 to 3600, depending upon motor. Floor space required, 78 x 46 in. Net weight with rear slide and motor, 2540 pounds.

Fellows Automatic Helical Cutter Sharpening Machine

The Fellows Gear Shaper Company, Springfield, Vermont, has placed on the market a fully automatic machine

Fig. 1—Front view of Automatic Helical Cutter Sharpening Machine showing electrical control. (Water guards are removed.) Fig. 2—Right-hand view of Automatic Helical Cutter Sharpening Machine showing motor-driven coolant pump and automatic tripping device.





adapted to the sharpening of so-called "normal sharpened" helical gear shaper cutters. This machine, a front view of which is shown in Fig. 1 and a right-hand end view in Fig. 2, is provided with complete electrical control. The machine is supplied with three motors. One motor reciprocates the table through a reduction gear and crank mechanism, another drives the pump for supplying coolant to wheel and work, and a third drives the grinding wheel by means of an endless canvas belt.

The machine is of exceptionally rigid construction and is provided with every necessary adjustment for sharpening "normal sharpened" helical cutters, either with a zero or a positive top rake. Cutters having helix angles up to and including 50 degrees can be sharpened on this machine.

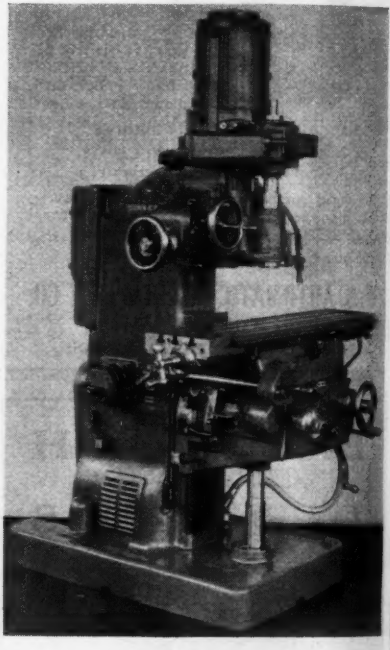
The indexing, as well as the reciprocation of the cutter, is taken care of automatically, and an electrical control is arranged so that the machine stops automatically at the completion of each revolution of the cutter. As shown in Fig. 1, three push buttons are provided at the front of the machine; one for starting the reciprocation of the table, the second for "jogging" the table electrically, which is necessary when setting up, and the third for manually stopping the machine. A guard is provided for keeping the stop button depressed when the operator is "jogging" or partially reciprocating the table while setting up the machine.

Owing to the rigidity of the machine and the accuracy with which it is built, it is possible to secure excellent results. The sharpening operation is conducted rapidly and accurately, and a smooth finish is produced on the cutting surface of the cutter teeth. With the machine as arranged, cutters up to 5-in. pitch diameter can be sharpened. All operating levers, push buttons, and so on, are within convenient reach of the operator from the front of the machine.

B & S No. 1 Standard Vertical Spindle Milling Machine

Brown & Sharpe Manufacturing Co., Providence, R. I., announces the addition of the No. 1 Standard Vertical Spindle Milling Machine (motor driven) to its line of "Standard" machines. The new machine provides a fast, sensitive unit for the operation of end mills and shell end mills, through spindle speeds ranging from 150 to 1,800 r.p.m. in either direction. The high speed series provides correct speeds when using small end mills from ⅛ in. to 3 in. diameter, made from either tantalum or tungsten carbide or high speed steel. The back gear range, up to 450 r.p.m., yields a smooth, powerful drive when using large cutters.

The machine is powered through two separate motors, one to drive the spindle



B & S No. 1 Standard Vertical Spindle Milling Machine.

and the other to furnish power for the table and spindle feeds. Both motors are controlled from a single push button station that is readily accessible from front and rear operating positions. All electrical controls and wiring are completely enclosed.

All movements of both table and spindle, including feed and speed changes, are controlled from either front or rear operating positions. Practically all of the features of the regular "Standard" line, including dual operating control, power fast traverse in all direc-

tions, anti-friction bearings in all main mechanisms including spindle drive, simplified (automatic) lubrication, unit type coolant pump, and hand adjustments to table, saddle and spindle are included in the design and construction of the No. 1 machine. A fast, flexible type of speed change is available for the speed motor through a drum type control and back gear lever which are conveniently located at the left front of the spindle head, available from front or rear.

The spindle head is provided with power feed which can readily be disengaged when not in use. In addition, an unusually fast hand adjustment of 2 1-10 in. per revolution of the handwheel is available, so that two turns of the handwheel will move the head the entire length of its travel.

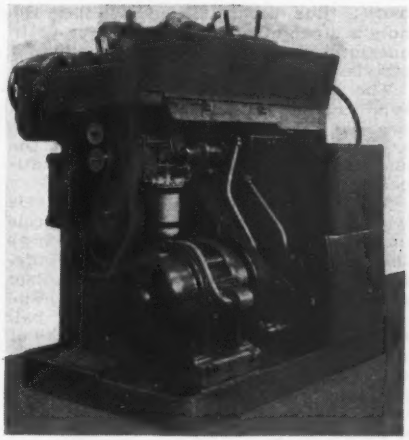
The longitudinal hand control is provided with a newly-designed safety handwheel that is automatically disengaged when not in use. The handcrank gives the advantage of long leverage, or the handwheel can be "rimmed" in making delicate adjustments.

Heald No. 81 Internal Grinding Machine

An internal grinding machine that is especially designed and built for the handling of small work, to be known as

Heald No. 81 Internal Grinding Machine.

the No. 81, has been developed by The Heald Machine Co., Worcester, Mass. The machine is fully automatic with the exception of starting, loading and unloading the work. It can be arranged to size the work "Size-Matically" or "Gage-Matically" in the same manner as the Heald No. 72 Size-Matic or Gage-



Rear view showing operating mechanism. This mechanism is completely enclosed.

Matic machines, or by a combination of the two methods. The No. 81 machine is similar to the No. 72 Heald line of internal grinders; however, there is one distinct difference in that the workhead and work reciprocate with the main table instead of the wheelhead and wheel. This arrangement makes it possible to drive the entire machine with one standard single-end motor. It provides the most rigid support for the wheelhead and permits the high speeds necessary on small holes. Mechanical controls can also be used for sizing, eliminating the necessity for electrical connections.

The motor is built in with built-in electrical controls, and a self-contained water tank is also located within the size limits of the base, thus reducing the floor space required to the minimum. The table is actuated by an improved hydraulic drive, all controls and adjustments for setting up being located within easy reach of the operator.

Where the work consists mainly of straight, open holes, the No. 81 arranged to size Gage-Matically is recommended. In this method of gaging each and every piece of work is plugged by two solid, positive gages which function at the back of the hole, automatically testing

the hole for size at each stroke of the wheel. For miscellaneous, blind, or taper work, the machine should be arranged to size Size-Matically, in which case there are no connections with the work; thus regardless of whether the hole is straight or tapered, with or without interruptions, open end or blind, it can be ground with equal ease.

The base is a heavy grey iron box-type casting, resting on a three-point bearing. One V and one flat way with a center distance of 7 in. support the sliding table. The ways are automatically lubricated.

The workhead on the No. 81 travels with and is mounted on a swivel circle on the table. All auxiliary units such as the plug sizing device on the Gage-Matic and fixture operating mechanism are enclosed by removable covers. The spindle is mounted on pre-loaded ball bearings to eliminate the effects of wear and to take up radial slack. On the Size-Matic, the workhead can be swiveled to take care of taper work up to 30 deg. included angle. The cross slide is mounted on a bridge at the right end of the base. It is arranged to give a coarse feed for the wheel for rough grinding and at a predetermined point changes to fine feed. With standard gears, the maximum feed is 0.00102 in. to a minimum of 0.00017 in. on the diameter of the work.

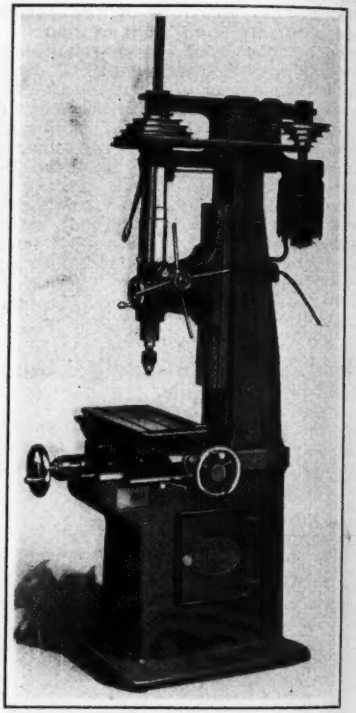
The feed mechanism is totally enclosed and runs in oil. The cross slide dial can be moved by hand from outside the feed box to aid in setting up the wheel. The wheel truing device trues the wheel just before the finishing cuts are taken. This unit is entirely self-contained and works automatically, the diamond being dropped into position hydraulically and raised by a cam on the cross slide.

The wheelheads used are built especially for high speed, the smallest size spindle running 42,000 r.p.m. A single-end 1,800 r.p.m. N.E.M.A. frame motor is used, of either 5 or 7½ h.p., and of any make that meets specifications. All drives are by belt or flexible coupling, no gears or chains being employed.

The floor space required is 42 x 55 in. Swing over table, 13½ in. Maximum length of hole that can be ground, 2 in. Maximum diameter of hole, 1 in. Hole through workhead spindle, 1¼ in. Workhead speeds (standard) 900 to 1,650 r.p.m. Table speeds unlimited up to 40 ft. per min. Table travel, 11 in. Weight of machine, net, 3,200 pounds.

Moore Jig Boring Machine

The Moore Special Tool Co., Inc., 358 John Street, Bridgeport, Conn., has brought out the jig boring machine shown in the illustration. It is stated that the designers have combined the extremes of simplicity and accuracy in this unit and have produced a machine



Moore Jig Boring Machine.

that is especially adapted for the boring of holes in jigs and fixtures for all kinds of small work.

Measurements between holes are taken by means of precision lead screws. The screws are made of a special wear-resisting alloy steel, hardened, rough ground, seasoned, and finish-ground all over. The screws are extra large in diameter, and the threads are lapped to a mirror finish. The nuts, which are of special bronze, are of generous length. Each nut is supplied with an oil reservoir and wick by which it is kept well

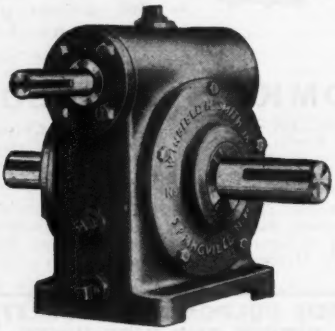
lubricated. The screws are entirely covered at all times to keep out dirt. Taper gibs are used in both cross and longitudinal movements. No clamping is done by means of the gibs, special provision being made for clamping.

The spindle is of hardened and ground tool steel, and revolves on five ball bearings; three in the quill and two in the pulley. The two lower bearings in the quill are pre-loaded. The spindle is driven by a 1/3 h.p., 1,200 r.p.m., vertically-mounted, ball bearing motor, through a V belt to five-step aluminum cone pulleys.

The machine is especially adaptable to manufacturing small parts, for which a large bracket can be furnished with a slip bushing through which holes can be drilled and reamed. The longitudinal range is 14¼ in.; cross-wise movement, 9⅛ in.; vertical travel of quill, 3⅝ in. The maximum distance from spindle to table is 15 in. Speeds from 200 to 2,000 r.p.m. are available. The largest hole that can be bored in tool steel is 1½ in. diameter. Total weight, approximately 1,150 pounds.

Smith No. 3½B and 4½T Speed Reducers

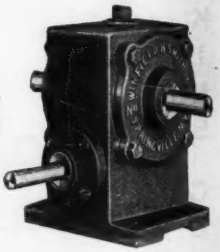
Winfield H. Smith, Inc., 30 Eaton Street, Springville, Erie Co., N. Y., has augmented its line of worm gear speed reducers by the addition of the two units



Smith No. 3½B Worm Gear Speed Reducer.

shown in the illustrations. This firm is now able to offer standard units for practically any requirement ranging from 1/20 to 5 h.p. output capacity.

The No. 3½B unit is designed for transmitting loads up to ¼ h.p., and is compact and efficient. The housing is made with a solid top and large side cover plate, which permits keying the worm gear to the shaft. Thus complete gear units can be assembled before they are put into the housing. The worm



Smith No. 4½T Worm Gear Speed Reducer.

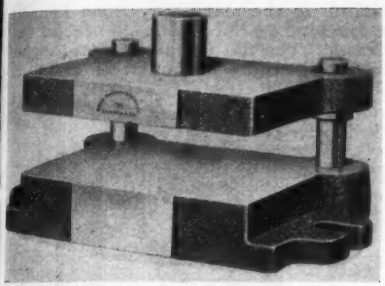
gear is of phosphor bronze, and is mounted on Timken roller bearings. The worm is of hardened steel, cut integral with the worm shaft and mounted on Gurney Radio thrust ball bearings. All shaft extensions are protected by special oil seals. Standard ratios for this unit are 58 : 1, 36 : 1, 18 : 1, and 9 : 1. Special ratios are available.

The No. 4½T unit is intended for the medium duty field, and is designed with the worm located above the gear. The worm is cut integral with the high speed shaft, which is mounted on Radio thrust ball bearings. The worm gear is of phosphor bronze and is keyed to the slow speed shaft, which is mounted on Timken roller bearings. Special oil seals and drilled return passages eliminate possibility of oil leakage. Ratios and h.p. capacities are from 1 : 6 to 1 : 60, based on 1,750 r.p.m. of the high speed shaft.

Danly "Commercial" Line of Standardized Die Sets and Shoes

Danly Machine Specialties, Inc., 2122 South 52nd Avenue, Chicago, Ill., has introduced a new line of standardized die sets and shoes to be known as the Danly "Commercial" Line. The Commercial Line supplements but does not replace the Danly "Precision" line, which is being maintained in its entirety.

The "Commercial" die sets are intended to give tool rooms and tool shops a line of units priced to meet the reduced productions that are now current throughout industry. The sets are de-



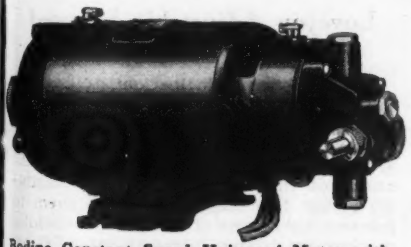
Danly "Commercial" Die Set, Square Type.

signed to handle economically requirements of from 300 to 300,000 pieces.

The shoes and sizes are identical with those of the Danly "Precision" die sets, the change being made in the guide-posts and bushings. The guide-posts are of hardened manganese steel and the bushings are of special nickel alloy to prevent all chance of binding and to minimize wear. Each set is literally built to order from these standardized parts. Danly "Commercial" sets can be changed into Danly "Precision" sets by merely changing pins and bushings.

Bodine Constant Speed Universal Motor With Electric Governor

A new line of series-wound motors with improved electric governors is now being offered by the Bodine Electric Company, 2266 W. Ohio Street, Chicago, Ill. The electric governor has been thoroughly tested on such applications as talking machine picture equipment, electric pyrometer control drives, office appliances, traffic signal control, and so on. Although most frequently applied to the series-wound motor, the governor may also be used with the shaded-pole type motors.

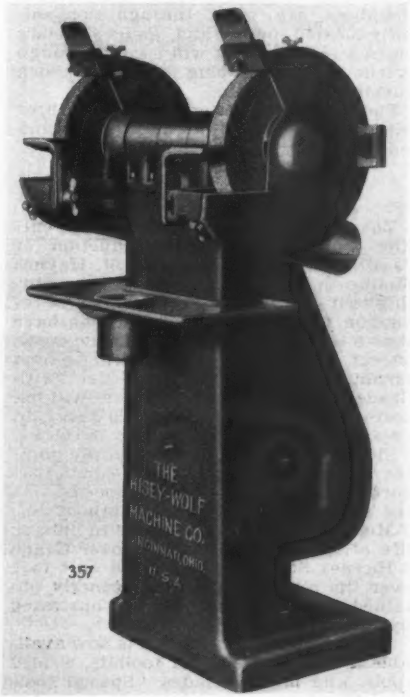


Bodine Constant Speed Universal Motor with electric governor.

Accuracy and rapid acceleration are features of these motors. The motor is available in two forms: Form F, adjustable while running, and Form S, adjustable at stand-still only. In the design of the motor, the electrical constants of the governor are carefully calculated to meet the requirements of the duty cycle and operating cycle of the load. To insure a proper and satisfactory application, the company offers its laboratory facilities for testing the motor in connection with the user's apparatus.

"Hisey" Texdrive Grinder for High Speed Wheels

A Texdrive Grinder for use with 10, 12, or 14-in. Vitrified or high speed grinding



"Hisey" Texdrive Grinder for H. S. Wheels.

wheels has been brought out by The Hisey-Wolf Machine Co., Cincinnati, Ohio. The machine is designed so that the wheels operate at the proper speed,

which is made possible by mounting the motor on the back of the pedestal and by the use of a V-belt drive to the spindle.

Extra large ball bearings (or Timken roller bearings) are mounted on a heavy shaft of special spindle steel. The bearing boxes, which are keyed to the pedestal, can be removed as a complete unit with the shaft, permitting quick renewal of belts without disturbing the bearings themselves. Cast steel wheel guards pivot to any angle and have hinged covers.

The straight front pedestal presents the wheels far in advance of the machine proper, affording maximum freedom of movement to the operator. A belt guard entirely encases the sheaves and belts, yet the motor can be adjusted without removing the hood. Lubrication chambers are filled through conveniently-located cups, and gauges insure that excess lubricant will escape through overflow. Drain plug permits quick flushing of bearings.

The machine can be furnished with or without motor, as the base will accommodate any standard motor.

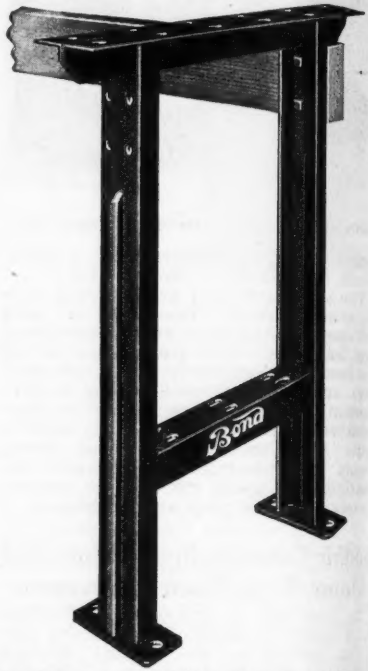
Haynes "J-Metal"

The most recent innovation in the cutting tool field is the introduction of "J-Metal," a special grade of Haynes Stellite that has been developed for cutting cast iron, semi-steel, and steel. Production tests on actual operations have shown that J-Metal, with the same depth of cut and same feed usually used in turning cast iron and semi-steel with Grade 3 Haynes Stellite cutters, will operate at a maximum speed 50 per cent greater than was possible with the Grade 3 Stellite. At this higher speed the number of pieces per grind will equal that normally produced at lower speeds. At the same speed, feed, and depth of cut, J-Metal will show an increase in cutting life of at least 100 per cent over Grade 3 Haynes Stellite, and a ratio of 4 to 1 over the number of pieces formerly obtained per grind has been demonstrated by actual tests.

Haynes "J-Metal" Stellite is now available in standard sizes of toolbits, welded tools, and milling blades. Special tools of J-Metal can be made up if desired.

Bond Steel Bench Legs

Bench legs made of steel, electrically welded throughout and drilled ready for the planking to be applied, have been placed on the market by Bond Foundry & Machine Co., Manheim, Lancaster Co., Penna. The flat top section is designed to permit the board or steel top to be

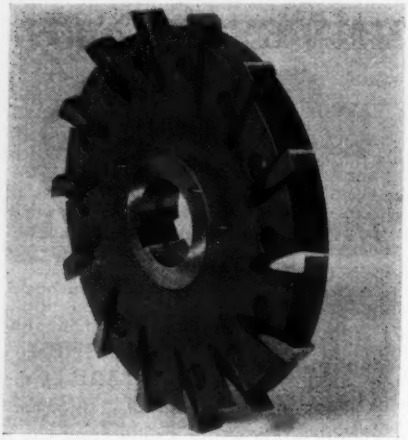


Bond Electrically-Welded Steel Bench Legs

fastened securely. The legs are ribbed to afford the maximum of strength, and the cross sections are of formed angles, making for strength and stability. A carefully-made back-board bracket completes the unit.

Lovejoy Adjustable Serrated Blade Side Milling Cutter

The Lovejoy Tool Company, Inc., Springfield, Vt., has brought out a side milling cutter that is designed with serrations in the blades to match corresponding serrations in the locking mechanism of the cutter, making it possible to adjust the blades and lock them in position by means of the positive-locking mechanism. The cutter is intended especially for use where side space is lim-



Lovejoy Adjustable Serrated Blade Side Milling Cutter.

ited, and is made for either right or left hand.

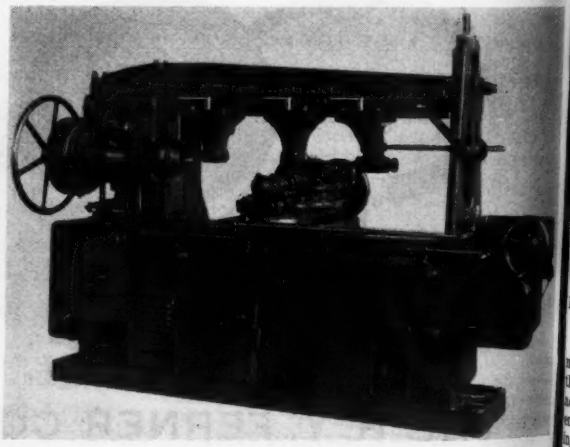
The cutter has a blade adjustment of approximately one-half the total length of the blade, to compensate for wear and grinding and to reduce blade costs to the minimum. The cutter can be furnished with blades of cobalt high speed steel, Stellite, or tantalum or tungsten carbide. The size of the blade depends upon the overall thickness of the cutter.

Barber-Colman Spline Shaft Hobbing Machine

Barber - Colman Company, Rockford, Ill., has produced a new model hobbing machine which is especially suitable for the cutting of long spline shafts. The standard Type "A" machine has been adapted for this work by the lengthening of the bed. Other parts of the machine such as the feed screw, the automatic stop rods and bars, the power shaft for the feed box, and the overhanging arm are lengthened accordingly. The outer end of the overhanging arm is raised and lowered by a screw driven from the work spindle elevating mechanism, thus insuring that alignment of the arm with the bedways will be maintained. All other parts of the long bed model are the same as the standard Type "A" machine.

The accompanying illustration shows the type of special tooling which is generally supplied for spline shaft work. The clamping has a collet type nose with a large handwheel for clamping the work firmly in the collet. Two work supports are mounted on the overhanging arm, these consisting of half sleeves in which the work revolves and which will prevent long shafts from springing out of line during the cut.

As explained in a previous announcement concerning the Type "A" machine, this model of the Barber-Colman line is the latest that has been developed and has a number of valuable features which contribute to the production of consistently more accurate work than previous machines have afforded.

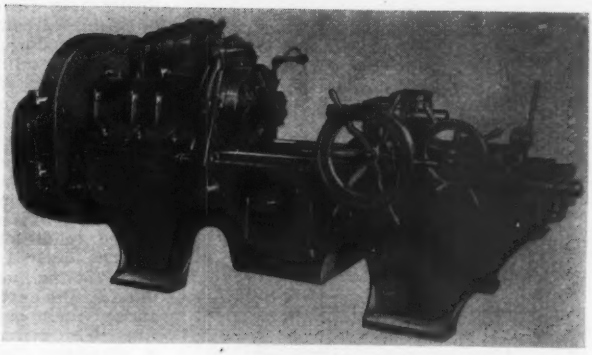


Barber-Colman Long Bed Type "A" Hobbing Machine For Spline Shafts.

Landis 4-In. Rotary Die Head With Roughing and Finishing Attachment

A new die head having a capacity up to and including 4 in. diameter and

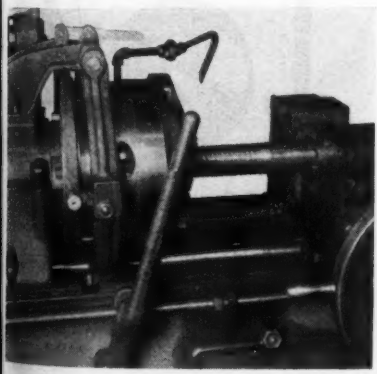
equipped with a roughing and finishing attachment has been developed by the Landis Machine Company, Inc., Waynesboro, Penna., for use on the Landis 4-in. leadscrew threading machine. This die head is recommended for cutting coarse pitch threads on valve stems, vise screws, jack screws and similar classes of work which require great accuracy and an exceptionally smooth finish.



Landis 4-In. Leadscrew Threading Machine With Rotary Die Head.

The roughing and finishing cuts are controlled by a latch mounted on the yoke bracket. The release of the latch, after the roughing cut is made, permits the die head to close for a light finishing cut. The amount of metal removed during this cut is approximately 0.045 inch.

No cutting strains are transmitted either to the die head yoke or the roughing and finishing attachment. The die head is locked within itself when set for either the roughing or finishing cut, thus making it possible to produce threads that are free from taper and uniformly accurate for size. A pitch indicator is employed to assist the operator in timing the engagement of the leadscrew nut for the finishing cut. The die head can be used for cutting single, double, triple and quadruple threads from ¾ in. to 4 in. in diameter with a maximum lead of ½ inch.



Landis 4-In. Rotary Die Head With Roughing and Finishing Attachment.

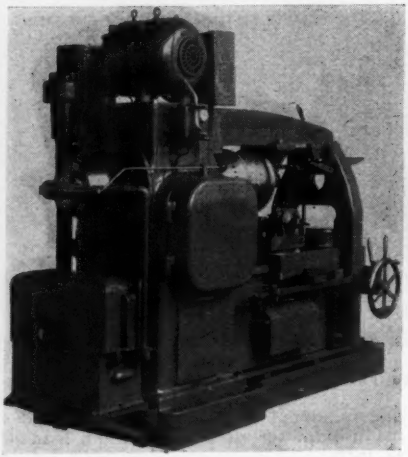
"Rust-tox"

The Skybryte Co., 1921 East Nineteenth Street, Cleveland, Ohio, is now marketing a liquid rust resistant called "Rust-tox" with which it is said that rust and corrosion can be successfully combatted. Rust-tox may be brushed or sprayed on at any temperature above 35 deg. F., and will normally cover about 1,500 square feet per gallon. This figure varies with the porosity of the surface. The liquid will, however, effectively seal a rusted surface and prevent further rusting, making it possible to maintain the surface of the material indefinitely.

If desired, Rust-tox may be pigmented, and is said to be an excellent vehicle for aluminum flakes, having successfully passed all the requirements set up by the Aluminum Company of America. The flexible surface provided by Rust-tox will resist the expansion and contraction of the metal. Rust-tox is said to be heat-resisting up to 550 deg. F., and will resist all fumes of acid, oxygen, smoke, or salt air. It is especially useful in protecting export shipments from salt air corrosion.

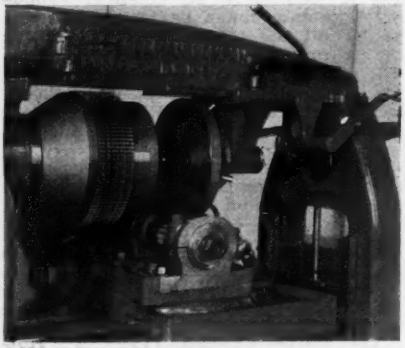
Barber-Colman Production Machine For Automobile Ring Gears

The Barber-Colman Type "B" Hobbing Machine has been adapted, by means of a special expanding work arbor actuated by a compact and rapid-operating hydraulic unit, for the pro-



Barber-Colman Type "B" Hobbing Machine With Hydraulically-Operated Expanding Arbor For Cutting Ring Gears.

duction hobbing of starter ring gears for automobile flywheels, according to an announcement by the manufacturers, Barber-Colman Company, Rockford, Ill. The special work arbor is particularly interesting because of the expanding feature which eliminates the trouble ordinarily encountered when an attempt is made to load an arbor with a number of thin, large-diameter ring gears. The load can be put on and taken off without any difficulty but the blanks are



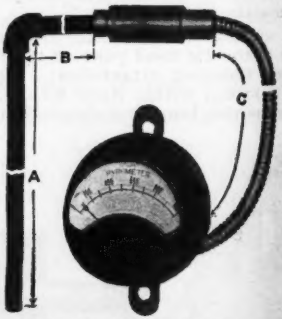
Close-Up of Expanding Work Arbor For Cutting Ring Gears On Barber-Colman Type "B" Hobbing Machine.

firmly held during the cut, as the arbor is expanded within them and they are clamped securely from the ends.

This expanding mechanism is operated by oil pressure from a unit mounted at the end of the machine which contains an oil reservoir and a motor-driven pump with an automatic control that maintains a certain pressure in the oil lines at all times. The operating handle conveniently located on the front of the machine shifts the control valves as required to direct the hydraulic pressure for the desired operation of the arbor. This tooling has shown remarkable results in the cutting of ring gears, having turned them out as fast as one per minute. The remainder of the machine is a standard Barber-Colman Type "B" hobber.

"Alnor" Model 223 Pyrometer

A complete pyrometer unit especially intended for low temperature work in connection with soft metal pots, die casting machines, oil tempering baths, and



"Alnor" Model 223 Pyrometer.

similar service has been developed by the Illinois Testing Laboratories, Inc., 146 West Austin Avenue, Chicago, Ill. The complete unit consists of an indicator with a scale range of 0 to 1000 deg. F., a pair of alloy wires encased in a flexible metal hose, and a quick-acting right angle type thermo-couple or "fire end."

The indicator can easily and quickly be mounted on a wall, post, or other support away from possibility of accidental injury. The indicator dial is 3½ in. long, with large figures and legible markings which make it easy to read. The thermo element is enclosed in heavy wrought iron to withstand hard service. This housing forms one element of the thermo-couple and thus aids in the re-

sponse to temperature change. The connecting wires between the thermo element and the indicator are enclosed in heavy flexible metal tubing which is a protection against splashing of hot metal, fumes, or damage.

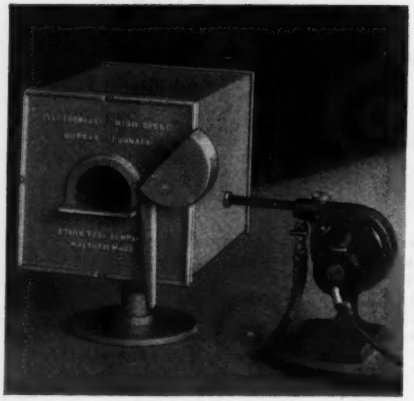
The dimension "A" of the standard thermo-couple is 18 in., and "B" is 6 in. The length of the standard connecting cable "C" is 10 feet. These dimensions may be changed as required. The instrument can be had for higher temperature ranges, such as are required for carbon or high speed steel heat treating and similar service.

"Electroblast" High Speed Muffle Furnace

In connection with the "Electroblast" Gas-Electric Blow Torch that is manufactured by Stark Tool Company, Waltham, Mass., this company is putting out an unusually efficient small muffle furnace for which the torch acts as the burner. The furnace is intended for use in hardening small tools and parts of high speed or carbon steel, and is fitted with a high grade muffle and unusually heavy insulation which makes it possible to attain a temperature of 1600 deg. F. in six minutes. High speed temperatures up to 2600 deg. F. can be obtained in from 15 to 25 minutes.

The muffle is 6½ in. long, 3⅛ in. wide, and 2½ in. high, inside, which is sufficiently large to handle the general run of high speed work in the tool room.

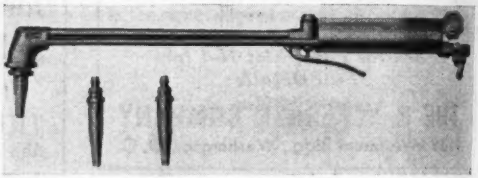
The ability to heat quickly, plus low operating cost—only 7c per hr.—make possible the economical heat treating of single or small lots of tools or parts and eliminates the necessity of starting a large furnace for such work. On carbon steel the operating cost is approximately 4c per hr. The furnace is so designed that the work is practically free from scale and, while intended for use with the "Electroblast" Torch, it may be fired by any blowtorch of sufficient capacity.



"Electroblast" High Speed Muffle Furnace.

Type NVM Welding and Cutting Torch

Tips, Inc., 515 Cathedral Street, Baltimore, Md., announces a new cutting and welding torch, to be known as the Type NVM. The Type NVM torch is of advanced design and it is said that it will cut or weld any thickness of metal within range of the process.



Type NVM Welding and Cutting Torch.

The torch is strongly constructed of high grade materials. The valves and base are of high grade forged bronze and the tubes are special weight, triangularly arranged to give the greatest transverse strength. The high pressure valve is operated with an improved lever underneath the torch, which has been designed for simplicity of operation. All replacements can be made without disassembling the torch, as the important parts are accessible from the outside.

The 90-deg. head of the torch is designed to take standard Type NV conical seated tips which have the same standard as those used in Airco Davis-Bournonville cutting torches Styles 8000, 3000A, 3000B, and so on.

Nazel Hammer Folder

Users or prospective users of power hammers will be interested in a folder "Endorsed by Over 1,050 Firms in 66 Different Industries," which has been issued by Nazel Engineering & Machine Works, 4045 North Fifth Street, Phila-

delphia, Penna. The folder lists some of the outstanding features of the Nazel Power Hammer, with a partial list of users. Free upon request.

National-Cleveland Radial Helicoid Grinding Machine Booklet

A 36-page booklet in which the underlying principles and method of operation by which the National-Cleveland Radial Helicoid Grinding Machine produces radial helicoid cutting faces on staggered-tooth helical gear-shaped cutters is being offered by The National Tool Co., Cleveland, Ohio.

The book contains a detailed explanation of a "radial helicoid" as applied to the design of gear-shaped cutters, and the manner in which the radial helicoid cutting face is produced on the cutter by grinding. A number of drawings illustrate the text. The book also contains descriptions and illustrations of the National-Cleveland Radial Helicoid Grinding Machine, with instructions for setting up and operating the machine.

A copy of the book can be had by any mechanical executive who addresses his request on his firm letter-head.

Eisler Speed Spot Welder Catalog "W"

All of the various types and kinds of electric welding machines made by the Eisler Electric Corporation, 761 South Thirteenth Street, Newark, N. J., are described and illustrated in Catalog "W," which has been issued by this firm. The catalog is 9 x 12 inches in size, with illustrations in color. In addition to the descriptions and specifications of the machines, a number of drawings are included, showing examples of welding jobs, with descriptive captions. A copy of the catalog will be sent to any mechanical executive upon request.

For Your Catalog Library

Check any of these useful publications that you want, write your name, firm name, title, and address on the margin, then tear out the page and send to Modern Machine Shop, 128 Opera Place, Cincinnati, Ohio. They will be forwarded to you promptly without cost or obligation. Please restrict your list to not more than ten.

Pointers on Internal Grinding: A folder containing data on the selection of internal grinding spindles, selection of grinding wheels, methods of holding work, grinding bushings, grinding holes with keyways or slots, and other useful information will be sent free to any machine shop executive. Address Abrasive Company, Tacony and Fraley Streets, Philadelphia, Penna.

Cut Your Sawing Costs: "Lenox" hack saw blades and band saws are guaranteed to effect savings on your sawing operations. Write for information to American Saw & Mfg. Co., Springfield, Mass.

Ames Gages: Catalog No. 50, issued by the B. C. Ames Company, Waltham, Mass., contains complete descriptions and illustrations of the dial gages, gage heads, upright gages, cylinder gages, dial micrometers, and precision verifiers, special gages and attachments made by this company. Copy free upon request.

Scraping By Power: Bearing surfaces can now be scraped with a power scraper that is quicker and easier than the old-fashioned hand method. The tool is described in a folder that is issued by Anderson Bros. Mfg. Co., 1926 Kishwaukee St., Rockford, Ill. Sent free on request.

Machine Shop Accessories: Catalog B-27, issued by the Armstrong Bros. Tool Co., 328 N. Francisco Ave., Chicago, Ill., describes the line of tool holders, boring tools, wrenches, pipe tools, ratchet drills, lathe dogs, and other tools manufactured by this company.

Greenerd Arbor Presses: Catalog No. 36, issued by the Edwin E. Bartlett Co., Nashua, N. H., describes and illustrates all the various types and sizes of arbor presses made by this firm. Copy free upon request.

Automatic Oiled Die Sets: The automatic oiled die sets, die shoes, punch holders, leader pins, bolster plates, bushings, and other standard die parts made by the E. A. Baumbach Manfg. Co., 1806 S. Kilbourn Ave., Chicago, Ill., are described in Catalog No. 5, which has been issued by that company. Sent free upon request.

Mounted Grinding Wheels for use in small holes such as are found in bushings, dies, gears, tools, etc., are described in a catalog that has been issued by the Chicago Wheel & Manfg. Co., 110 S. Aberdeen St., Chicago, Ill. Copy free upon request.

Flexible Couplings in which there are no screws, no bolts, no grease, no projections, and which run as smooth as a pulley are described in Bulletin 103-B, which can be had by addressing The Clark Controller Co., 1146 East 152nd Street, Cleveland, Ohio.

Motorize Your Cone Pulley Lathes: An attachment that can be applied to your lathe with four bolts makes it possible to motorize and modernize your lathes. Write for information to Cullman Wheel Co., 1336 Altgeld St., Chicago, Ill.

Die Makers' Supplies: A complete line of die sets, leader pins, bushings, and other die makers' supplies are described in a book that is issued by the Danly Machine Specialties, Inc., 2104 South 52nd Avenue, Chicago, Ill. Sent free upon request.

Grinding Wheel Dressers: All of the different types of grinding wheel dressers made by the Desmond-Stephan Mfg. Co., Urbana, Ohio, including Desmond-Huntington, Desmond-Sherman, Zig-Zag, Diamo-Carbo, and diamond dressers, are described and illustrated in a catalog that has been published by the firm mentioned. Free upon request.

Steel Spacing Washers: Milling jobs can be set up quicker by using standard spacing washers, made by Detroit Stamping Co., 3445 West Fort Street, Detroit, Michigan. Write for information.

Interchangeable High Production Tools: Catalog No. 28, issued free by the Eclipse Counterbore Co., 7410 St. Aubin St., Detroit, Mich., describes and illustrates the interchangeable counterbores, spot facers, end form cutters, and other end cutting tools made by this firm.

"Speed" Spot Welders for welding metals from 0.0005 in. to 5/8 in. thick are described in a catalog that can be had by addressing Eisler Electric Corp., 761 South 13th Street, Newark, N. J.

The Involute Gear Simply Explained: A direct, clear explanation of the theory and principles of involute gearing without the use of higher mathematics can be obtained without charge by addressing The Fellows Gear Shaper Co., 78 River St., Springfield, Vt.

Questions To Ask Before Buying a Jig-Boring Machine: A list of the fine points to look for in a jig-boring machine, with descriptions and illustrations of the working parts of the Swiss Jig Borer, can be obtained free by addressing The R. Y. Ferner Co., 1511 K St., N. W., Washington, D. C.

Formica Silent Composition Gears: A booklet telling about the uses and advantages of Formica Silent Shock Absorbing Gears, and containing a considerable amount of valuable data with rules and tables for laying out, cutting and using gears. Sent free by Formica Insulation Co., 4632 Spring Grove Avenue, Cincinnati, Ohio.

Stampings of any kind or size can be obtained from Gerding Brothers, 5 East Third Street, Cincinnati, Ohio. Write for particulars.

Ball and Roller Bearings, either journal or thrust, for all purposes and in all sizes, are described and illustrated in catalog No. 9 which has been issued by The Gwilliam Company, 360 Furman Street, Brooklyn, N. Y. Copy free upon request.

Chucks: The complete line of 3-jaw and 4-jaw universal and independent chucks marketed by H. J. Hagen, 101 Walker Street, New York, N. Y., is described and illustrated in a catalog that can be had by addressing the firm as above.

Precision Bench Lathe Work can only be done on finely-built, accurate machines. The complete line of Hjorth Precision Bench Lathes is described and illustrated in a catalog that has been issued by Hjorth Lathe & Tool Company, 60 State Street, Boston, Mass. Copy free upon request.

Pyrometers: Inexpensive portable and stationary, single unit and multi-circuit pyrometers are described in a catalog issued by Illinois Testing Laboratories, Inc., 146 West Austin Avenue, Chicago, Ill. Copy free upon request.

Special Mil-Waukee-Mils of Standard Units: A milling machine of which the base, heads, columns, and other parts are built in standard units, thus enabling the user to order a machine that will be especially adapted for his job, is described and illustrated in Catalog No. 36, issued by the Kearney & Trecker Corporation, Milwaukee, Wis. Free to machine shop executives.

Threading Machinery: Catalog No. 32, containing full descriptions of Landis threading machines, stay bolt threading machines, bolt factory threading machines,

automatic forming and threading machines and chaser grinders can be had without charge by addressing Landis Machine Co., Inc., Waynesboro, Penna.

Air-Operated Work-Holding Devices: A booklet showing how air-operated chucks and devices of various kinds can be applied to different kinds of machines to save time and labor has been issued by The Logansport Machine Co., Logansport, Ind.

Save Your Diamonds by using the Diamond Point Angle Tool. Write for information to Mendes Cutting Factories, Inc., Charlevoix Bldg., Detroit, Mich., or 105 West 40th Street, New York, N. Y.

Compound Spot-Facing Tool: A spot-facing tool retracting, serrated roughing cutters and fixed finishing cutters in the same tool will break up the scale easily and do accurate work. Write for bulletin to Mummert-Dixon Co., 120 Philadelphia St., Hanover, Penna.

"The Answer to Your Gear Problems": Information as to correct methods of cutting and finishing gears will be supplied without charge by The National Tool Co., Cleveland, Ohio. This firm also carries a complete stock of gear shaper cutters and markets the National-Cleveland Spur and Helical Gear Grinding Machine.

Ball and Roller Bearing Data Sheets: A complete set of data sheets showing all the dimensions and loads at given speeds, and giving instructions for mounting precision ball bearing and Hoffmann roller bearings, can be obtained without charge by addressing the Norma-Hoffmann Bearings Corporation, Stamford, Conn.

"Commercial Lapping for Close Limits and High Production" is the title of a booklet that discusses hand and machine lapping, types of lapping tools and machines, workholders for machines, preparation of laps, preparation of work for lapping and other important points. A copy may be had by addressing Norton Company, Worcester, Mass.

Die Making Machines: How dies, templates, gages, etc., can be sawed out, filed, and lapped easily and accurately on Oliver die making machines is fully described in a bulletin issued by the Oliver Instrument Company, 1430 Maumee Street, Adrian, Mich. Mailed upon request.

Good Vises Breed Good Work: Good bench work is impossible with badly-made or worn-out vises. The seven outstanding features of the Parker Vise are described in a bulletin that can be had by addressing The Charles Parker Co., Meriden, Conn.

Good Gears of all kinds—spur, spiral, bevel, worm, hypoid—in fact, any kind or type of gear desired, large or small, machined to an excellent finish and the highest degree of accuracy, may be obtained from Perkins Machine & Gear Co., 151 Circuit Ave., Springfield, Mass. Write for estimates.

Bench Lathe Mounting and Driving Equipment: Bulletin 120-A, issued by Rivett Lathe and Grinder Corporation, Brighton, Mass., contains complete descriptions and illustrations of modern and conventional countershaft, individual motor drive jackshaft, and speed box motor drive, also benches, cabinets, oil pans, etc. Copy free upon request.

Fullmore Industrial Clutch: A multiple disc clutch, made in two types, to run in oil or dry, and which is so built that it can be operated at high speeds, is illustrated and described in a folder that will be sent free by the Rockford Drilling Machine Company, Rockford, Ill.

Automatic Lubrication: Individually motor-driven pumps that keep the work flooded with lubricant are described in a booklet that has been published by the Ruthman Machinery Co., Front and Pike Sts., Cincinnati, Ohio.

Steel Stamps and Marking Dies: Full information as to steel stamps, steel roller dies, embossing dies, and embossing rolls made by the Schwerdtle Stamp Co., 10 Cannon Street, Bridgeport, Conn., can be had by writing this firm.

Economies in Material Handling: A volume of facts about planned load handling, with actual examples of economies in time, material, and labor costs that have been effected with Shepard electric hoists will be sent free upon request to Shepard-Niles Crane & Hoist Corp., 424 Schuyler Avenue, Montour Falls, N. Y.

Simonds Files: A useful book on files showing the various styles made, their uses, cross-section, and cuts, and containing a number of reference tables and other information useful in a machine shop can be had by addressing Advertising Dept., Simonds Saw & Steel Co., 470 Main Street, Fitchburg, Mass.

The Most Efficient Speed for the operation of special production units, power conveyors, and other machinery by the use of the WHS Speed Reducer and how it can be obtained is told in a bulletin that will be mailed free by Winfield H. Smith, Inc., 30 Eaton St., Springville, N. Y.

Speed and Accuracy in Straightening: The Springfield Straightening Press is an ideal tool for use in straightening any length or size of rough or finished work. Send for illustrated folder. Address The Springfield Machine Tool Co., 630 West Southern Avenue, Springfield, Ohio.

"Stark" Motor Drive Unit: A motor drive unit for use with bench lathes, bench millers, and other machines operating on ½ h.p. with a variable speed reduction gear is described in Bulletin "F," issued by Stark Tool Co., Waltham, Mass. Copy free upon request.

Cutting and Grinding Facts: A discussion of cutting oils and lubricants, together with descriptions and illustrations of various kinds of jobs upon which cutting oils are used, is contained in a booklet that is issued by the Sun Oil Company, 1608 Walnut Street, Philadelphia, Penna. Free upon request.

Tips for Torches: Standardized cutting and welding tips that are interchangeable with various types of torches are now available. Write for catalog to Tips, Inc., 515 Cathedral Street, Baltimore, Md.

Chuck With Air: How time and labor can be saved by the use of air-operated chucks, cylinders, and other equipment is told in a book which describes "Hopkins" Air-Operated Equipment. Published by The Tomkins-Johnson Company, 620 N. Mechanic St., Jackson, Mich. Sent free upon request.

Change drilling speeds instantly without stopping the machine or touching a belt. This can be done with the Victor Super-Drill, made by U. S. Automatic Bar Machinery Co., Newtonville, Boston, Mass. Bulletin free upon request.

Electrically-Driven Portable Tools: The "U. S." line of electric drills, die grinders, electric screw drivers, surface grinders, tool post grinders, and bench and floor grinders is described in Catalog No. 29, which has been published by The United States Electrical Tool Co., 2471 W. Sixth St., Cincinnati, Ohio.

Double-Life End Mills: Weldon Double-End Type End Mills, made with blades on each end, are described in Catalog No. 6, issued by The Weldon Tool Company, 1426 West Third Street, Cleveland, Ohio. Other small tools made by this firm are also described and illustrated in this catalog.

Shop Furniture: A catalog describing and illustrating all kinds of shop furniture, including benches, vises, steel stands, foremen's desks, chip trucks, steel racks for bar stock, steel tote boxes, and other equipment will be sent free upon application to The Western Tool & Manufacturing Co., 1620 East Pleasant Street, Springfield, Ohio.

Wrenches For Every Use: "Guaranteed Against Breakage" tappet wrenches, pipe and fitting tongs, offset wrenches, and wrenches for all other uses are described and illustrated in a series of folders which can be obtained without charge by addressing J. H. Williams & Co., Buffalo, N. Y.

By GEO. ALEXANDER MANN

Educational

"I've learned my lesson,"
Said Sadie Mack.
"Never slap a guy
"When he's chewin' tobac."

You may be deaf to all traffic warnings, but you'll get your hearing.

Dad Sez

Woman is a caution,
An' has always been;
When not a speakin' out,
She's a listenin' in.

One o' the most discouragin' things about golf is ev'ry now and then you run across another liar who is doin' a little better job of it than you are.

What a Chance

An aviator
Is her heart's desire.
She says she'd like
To take a flyer.

It's sure the age o' puttin' things over when you find the grocer throwin' a handful o' raisins on the fly paper to serve as decoys.

Keen Kum-Back

"Did you raise them chickens?"
"Yes," answered Porter.
"They're now fifty cents;
"I raised 'em from a quarter."

The customer may be always right, but you can't prove it by his wife.

One o' the best ones we heard lately is 'bout the Scotchman who was too lazy to hook up the garden hose, so he spanked his children an' put 'em out in the flower bed to cry.

Speakin' o' Taxes

On the garbage men's ball
We took a chance.
We found the tax was low—
Ten scents a dance.

What makes it tough these days is there is so much to laugh off and so little to live on.

Make light of your troubles and keep 'em dark.

Ain't This Keen?

"Haven't you any heart?"
She asked with a quiver.
When the butch said, "No,"
She said, "Gimme liver."

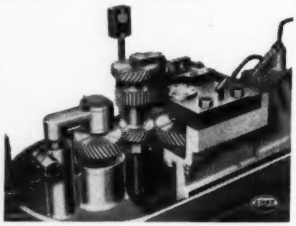
Our European debtors may be more or less shy on gold, but there's no discounting their brass.

If you let tomorrow take care of itself, that's all it will take care of.

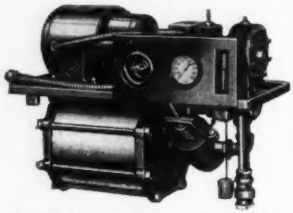
Budgers of budgets are usually deaf to deficits.

MODERN
Machine Shop
May, 1932

LOGAN Hydraulic or Air-Operated Equipment
used on Bolender Gear Burnishers



Close-up of Bolender Gear Burnisher with machine top removed, showing burnishing of spiral cluster gear.



Burnishing pressure is supplied by this LOGAN Electric-Hydraulic Power Unit. In some cases LOGAN Air-Operated equipment is used.

BOLENDER Gear Burnishers manufactured by the City Machine & Tool Works, Dayton, Ohio, offer all the advantages of progressive engineering in design and construction. It is natural, therefore, that only the finest hydraulic and air-operated equipment is consistently chosen. LOGAN equipment will be found on all these machines.

The Bolender No. 2 Gear Burnisher shown above is hydraulic-operated. LOGAN supplied the pressure tank, accumulator, relief valve, 300-lb. gage, high pressure pump, check valve, and Model A double-acting non-rotating cylinder.

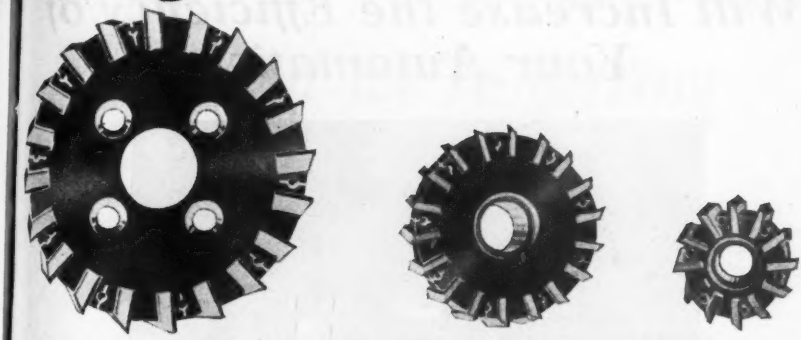
The ability of LOGAN engineers to efficiently and economically co-operate with manufacturers brings such comments that "the results have been very satisfactory and the selection of LOGAN equipment has been fully justified." LOGAN engineers are always ready to help you.

Send us your problems for estimates. There is no obligation.

THE LOGANSPORT MACHINE CO.
LOGANSPORT, INDIANA

Designers and Manufacturers of Air and Hydraulic Devices for Every Work-Holding Requirement!— and Many Other Purposes.

Bargains in Cutters



GREATEST VALUES EVER OFFERED
PRICES REDUCED 60%

We are closing out our stock of inserted tooth face milling cutters that fit on former style spindle nose machines (with B & S taper).

These cutters are of the Taper Pin construction suited for practically every class of milling. There are also a few Side milling cutters that can be used with any machine. Our supply is limited—no more will be made. Prices are slashed in order to close out this stock quickly.

An example of the tremendous savings: A 4" diameter Face mill with 14 High Speed Steel blades, formerly sold for $21.50 — today the sale price is $8.60. Similar reductions on all sizes from 2¾" up to 12" in diameter while they last.

At the rate these cutters are moving, the popular sizes will all be gone in another two weeks. Mail coupon today for complete price list and quantities still available.

KEARNEY & TRECKER
MILWAUKEE
MILLING MACHINES

KEARNEY & TRECKER CORPORATION,
6784 West National Ave., Milwaukee, Wisconsin

MMS-5-32

I am interested in your final closing-out sale of Taper Pin, inserted tooth cutters . . . Send me price list immediately.

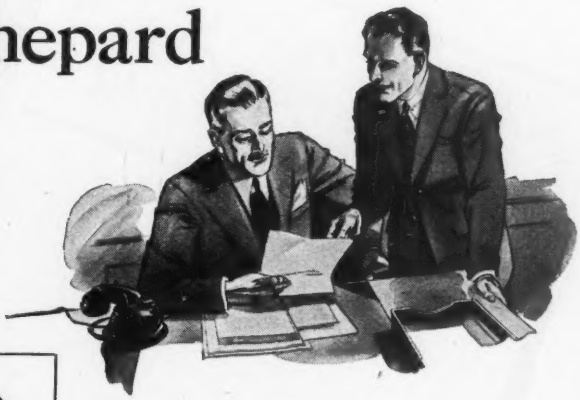
Name _____

Company _____

Address _____

Look at this price, Chief

...and we're getting a Shepard



Only Shepard can give you these features

1. *Balanced Drive, at two points diametrically opposite*
2. *Perfect alignment, maintained by all moving parts rotating around a common axis*
3. *Automatic Oil Bath Lubrication*
4. *Controlled by rope, push button or nutrig for every hoist*
5. *Precision variable speed control for both A.C. and D.C*
6. *Variety of speeds, types, lifts and capacity precisely suited to any specific service*

EVEN though you do have to look twice at prices these days, you need not lower quality standards when you are in the market for a hoist. You can still afford a Shepard. It will cost no more than an average hoist.

Shepard can put precision work and the finest of materials in electric hoists without increasing their final cost beyond the cost of average hoists. This is accomplished through mass production methods, which Shepard can apply to a degree unapproached by any other hoist builder. Shepard "unit construction" is particularly adaptable to quantity production. Also, Shepard sells nearly as many hoists as all of the other manufacturers combined.

Because Shepard Electric Hoists are made on a "unit construction" basis, it is possible to build economically the most comprehensive line of types and sizes. The hoist buyer can always obtain a Shepard exactly suited to the need.

Insist on Shepard Quality since it carries no price premium. If you are in the market for a hoist, the coupon below will bring a representative. Or, if you prefer, we will send an informative booklet

SHEPARD
CRANE & HOIST DIVISION

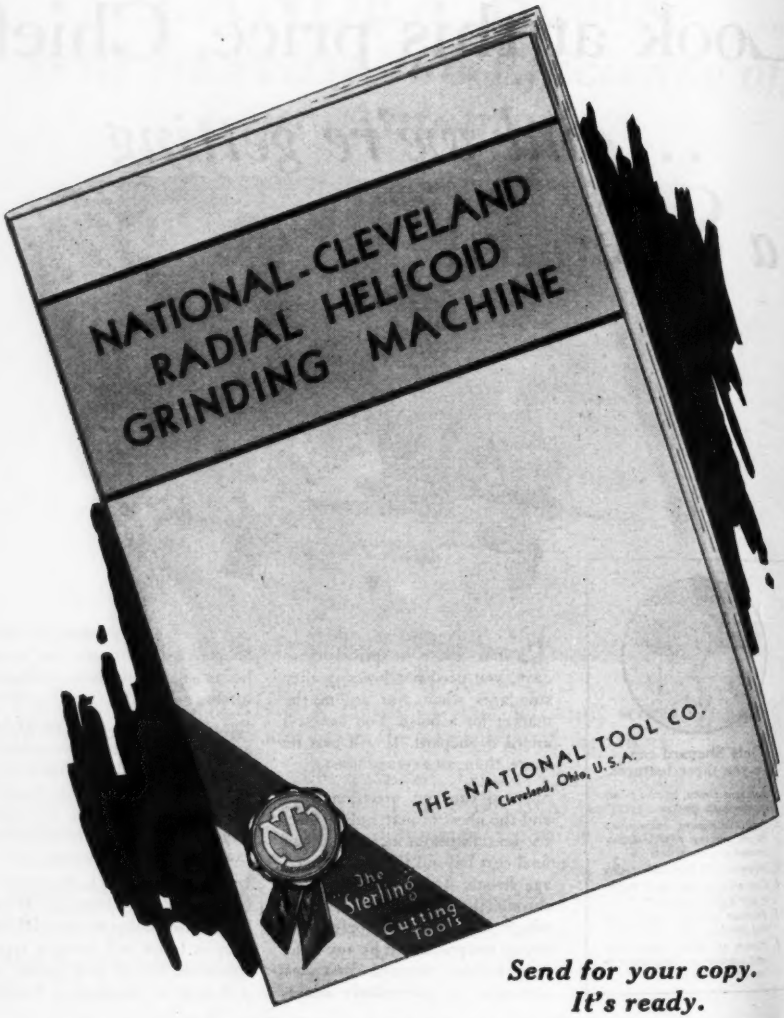
SHEPARD NILES CRANE & HOIST CORPORATION, 424 Schuyler Ave., Montour Falls, New York

☐ *Send booklet on Shepard Electric Hoists*

☐ *Send representative to prove that a Shepard costs no more—we are in the market for a hoist*

*Name*_____ *Company*_____

*Address*_____



Send for your copy.
It's ready.

The National Tool Company

CLEVELAND, OHIO

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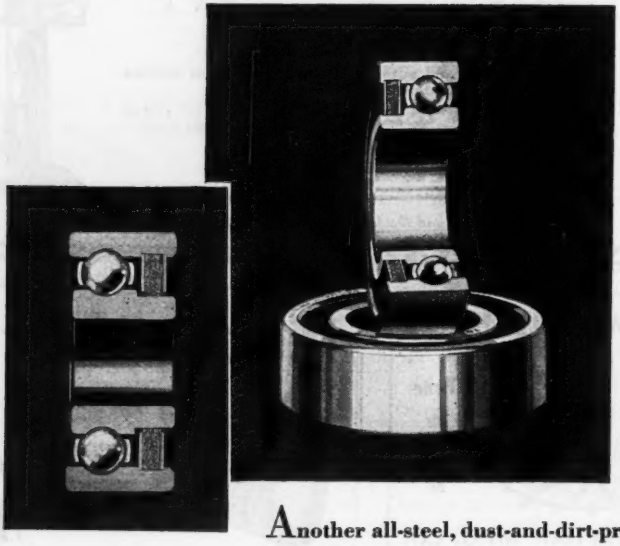

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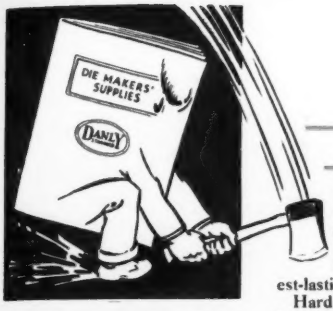

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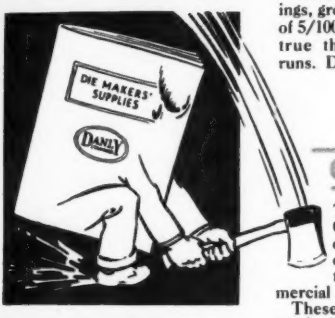

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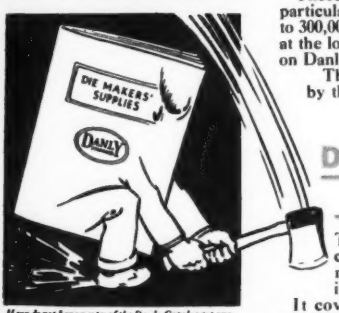

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